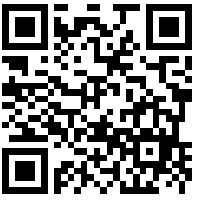
This is a reproduction of a library book that was digitized by Google as part of an ongoing effort to preserve the information in books and make it universally accessible.

Google™ books

https://books.google.com



CHINA SEA PILOT
VOL. II

COMPRISING
THE WESTERN AND NORTH-WESTERN COASTS OF BORNEO, THE PHILIPPINE ISLANDS FROM BALABAC ISLAND TO CAPE BOJEADOR IN LUZON, AND THE OUTLYING ISLANDS AND DANGERS IN THE SOUTHERN AND EASTERN PARTS OF THE CHINA SEA

SECOND EDITION
1950

WALTER
STACKS

Digitized by Google

THE LIBRARY

656
G79ca
v.2

ATTENT TO MARINERS
NOS. 1–1(THE FOLLOW-
ING INF(

N.M. Nc NG BRITISH

Nc SHIPOWNERS
AGENTS FOR
DROGRAPHIC

Nc ESSAGES TO

Nc ITISH MER-
/ESSELS.

No D MERCHANT

Nc

Nc

No. 6 INTERNATIONAL CODE OF SIGNALS, 1931. Amendment.

No. 7 CAUTION WITH REGARD TO SINGLE SHIPS APPROACHING SQUADRONS OR AIRCRAFT CARRIERS.

No. 8 WARNING SIGNALS TO DENOTE THE PRESENCE OF SUBMARINES.

No. 9 NAVIGATIONAL AND GALE WARNINGS, ETC., BROADCAST BY W/T AND R/T IN GREAT BRITAIN AND IRELAND.

No. 10 MINESWEEPING OPERATIONS.

No. 11 BRITISH ISLES.—LIST OF STORM SIGNAL STATIONS.

No. 12 SUBMARINE CABLES.

No. 13 INFORMATION ABOUT NAVIGATIONAL WARNINGS.

No. 14 AVAILABILITY AT COMMERCIAL PORTS OF NOTICES TO MARINERS.

No. 15 ADMIRALTY PUBLICATIONS.
Adoption of New Style Compass Rose on Admiralty Charts.

No. 16 ADMIRALTY TIDE TABLES.
Addenda and Corrigenda.

Copies of these Notices can be obtained ***gratis*** *by Masters of ships from Mercantile Marine Offices in the United Kingdom. Copies may also be inspected at Dominion, Indian and Colonial Government Shipping Offices and at British Consulates.*

Ps. 11732. Wt. 49362/H4246. 3/51. B. & T. Ltd. Gp. 460/1.

Digitized by Google

NOTATIONS OF SUPPLEMENTS AND ANNUAL SUMMARIES OF NOTICES TO MARINERS RELATING TO THIS BOOK.

To be filled in by Navigating Officer.

(In Chart Depôts the first two columns are alone to be filled up.)

Title.	Date of Publication and Number.	Date of insertion of Note in Margins of Book.

Digitized by Google

Digitized by Google

Gt. Brit. Hydrographic Office

Digitized by Google

NOTICE.

This volume should not be used without reference to the latest Supplement and Annual Summary of Notices to Mariners affecting it which may have been published.

A Supplement to this volume will generally be published annually until the latter is again taken up for revision.

After the publication of Supplement No. 1, each succeeding supplement cancels the former.

Between the time of the volume being taken up for revision and the publication of the new edition no supplement will be issued, but early in each year a Summary of the Admiralty Notices to Mariners affecting the volume, which have been published during the preceding year, will be issued as a separate publication.

The publication of all Supplements and Summaries of Notices to Mariners is announced in Admiralty Notices to Mariners.

The latest Supplement and any Annual Summary of Notices to Mariners that has been published affecting this volume will be obtainable gratuitously by purchasers of this volume from the Agents for the sale of Admiralty charts and other Hydrographic publications, on application either personally or by letter; in the latter case the cost of postage must be enclosed. For a list of these Agents *see* Admiralty Notice to Mariners No. 2, published annually.

Digitized by Google

Gt. Brit. Hydrographic Office.

CHINA SEA PILOT

VOL. II

COMPRISING

THE WESTERN AND NORTH-WESTERN COASTS OF BORNEO, THE PHILIPPINE ISLANDS FROM BALABAC ISLAND TO CAPE BOJEADOR IN LUZON, AND THE OUTLYING ISLANDS AND DANGERS IN THE SOUTHERN AND EASTERN PARTS OF THE CHINA SEA

SECOND EDITION, 1950

Crown Copyright Reserved

LONDON
PUBLISHED by the HYDROGRAPHIC DEPARTMENT, ADMIRALTY

To be obtained from
the Agents for the Sale of Admiralty Charts, etc.

1950

Price
Seventeen Shillings and Sixpence Net

Digitized by Google

Digitized by Google

To face page ii.]

656
G79ca

CAUTION.

IN THIS WORK THE BEARINGS ARE REFERRED TO THE TRUE COMPASS, AND WHEN GIVEN IN DEGREES ARE RECKONED CLOCKWISE, FROM 000° (NORTH) TO 359°.

THE BEARINGS OF LIGHTS ARE GIVEN FROM SEAWARD.

THE LATITUDES AND LONGITUDES GIVEN IN THE TEXT ARE APPROXIMATE.

THE DISTANCES ARE EXPRESSED IN SEA-MILES OF 60 TO A DEGREE OF LATITUDE.

A CABLE'S LENGTH IS ASSUMED TO BE EQUAL TO THE TENTH PART OF A SEA-MILE. IT IS OFTEN ACCEPTED AS BEING ONE-TENTH OF A NAUTICAL MILE.

THE DEPTHS ARE GIVEN BELOW CHART DATUM LEVEL WHERE NOT OTHERWISE STATED.

HEIGHTS ON THE LAND ARE GIVEN ABOVE MEAN LEVEL OF HIGH WATER SPRING TIDES.

FIGURES IN BRACKETS GIVEN AFTER THOSE DENOTING FEET, FATHOMS AND YARDS ARE THEIR EQUIVALENTS IN METRES.

TIME IS EXPRESSED IN THE FOUR-FIGURE NOTATION COMMENCING AT MIDNIGHT.

THE TERM "STEAM VESSEL" USED HEREIN INCLUDES ANY VESSEL PROPELLED BY MACHINERY.

A NAME IN BRACKETS, IMMEDIATELY FOLLOWING ANOTHER NAME, IS THE OBSOLETE NAME WHICH IS STILL SHOWN ON THE ADMIRALTY CHARTS. AS A GENERAL RULE, THE BRACKETED NAME IS ONLY INSERTED IN THE DESCRIPTION OF THE PLACE OR OBJECT PREVIOUSLY BEARING THAT NAME.

WHEN SHADING IS USED TO INDICATE COLOURS OF FLAGS, TIDAL LIGHT SIGNALS, OR BEACONS, IT IS AS FOLLOWS:

Yellow. Red. Blue. Green. Black.

1562963

Digitized by Google

Digitized by Google

ADVERTISEMENT TO THE SECOND EDITION

This volume contains Sailing Directions for the western and north-western coasts of Borneo and the western side of the Philippine islands, and includes a description of the outlying islands and dangers in the southern and eastern parts of the China sea.

This, the second edition, has been prepared by Captain F. M. Hodgson, R.N., and contains the latest information received in the Hydrographic Department.

The meteorological information has been revised by the Meteorological Office of the Air Ministry. Temperature is expressed in degrees Fahrenheit, rainfall in inches, speed in knots, and distance in sea miles unless expressly stated otherwise. Information received from meteorological services which do not use these units has been converted into the units mentioned above by the Meteorological Office.

Mariners and others are invited, in the interests of navigation, to forward to the Hydrographer, Admiralty, Oxgate Lane, Cricklewood, London, N.W.2, any information that may come under their notice which would be useful for the correction of the charts and other hydrographic publications issued by the British Admiralty; *early* advice as to newly discovered dangers, the establishment of, or changes in, any aids to navigation, is specially requested.

Copies of a form (H.102) on which to render information can be obtained gratis from the Hydrographer of the Navy, Hydrographic Supplies Establishment, Creechbarrow House, Taunton, Somerset, or from any of the Admiralty Chart Agents in Great Britain and abroad, a list of whom is published, annually, in Admiralty Notice to Mariners No. 2.

By the publication of this volume the first edition of the China Sea Pilot, Vol. II, 1936, and Supplement No. 8, 1949, are cancelled, and all information affecting that work contained in Notices to Mariners up to and including No. 1738 of 1950, has been embodied in this volume. For Temporary and Preliminary Notices to Mariners affecting this edition, the list of Temporary and Preliminary Notices to Mariners in force, published monthly in the weekly edition of the Admiralty Notices to Mariners, should be consulted.

A. DAY,
Rear-Admiral and
Hydrographer of the Navy.

Hydrographic Department,
Admiralty, London,
1st September, 1950.

Digitized by Google

BIBLIOGRAPHY

The following publications, other than British Government publications, have been consulted in the preparation of this edition :—

For the NEDERLANDSCH OOST-INDIË :—

Zeemansgids Voor de Oost-Indische Archipel, Deel I, 1949, and Supplement No. 1, 1950.
Lichtenlijst van Indonesië, 1949.
Lichtenlijst van Nederlandsch-Indië, 1947.
Bericht Ann Zeevarenden No. 1, 1940. Ned. Ind. Archipel.

For the PHILIPPINE ISLANDS :—

United States Coast Pilot, Philippine islands, Part I, 1939.
United States Coast Pilot, Philippine islands, Part II, 1939.
Republic of the Philippines List of Lights and Aids to Navigation, 1947.
Gazetteer of the Philippine islands, 1945.

Other publications :—

Statesman's Year Book, 1950.
Whitaker's Almanac, 1950.

Digitized by Google

CONTENTS

INTRODUCTORY

	PAGE
Caution	*facing* ii
Advertisement	iii
Bibliography	iv
List of Contents	v
List of Views	vii
Glossary of Terms	ix
System of Orthography	xi
Information relating to Charts, Sailing Directions, etc.	xv
Index Chart	*facing* 1

CHAPTER I

Borneo—Philippine islands—Currents—Signals—Submarine cables—Netherlands submarines—Radio stations—Air lights—Standard time—Coal and fuel oil—Repairs—Consul — Passages — Climate and weather — Climatic tables 1–41

CHAPTER II

Islands and dangers between Singapore strait and Borneo 42–70

CHAPTER III

West coast of Borneo : Padang Tikar to Tanjong Datu—together with Api passage 71–85

CHAPTER IV

North-west coast of Borneo—Tanjong Datu to Tanjong Baram, including dangers near the main track to Palawan passage 86–105

CHAPTER V

North-west coast of Borneo—Tanjong Baram to Tanjong Tulak, including Labuan island 106–125

Digitized by Google

CHAPTER VI PAGE

North-west coast of Borneo—Tanjong Tulak to Tanjong Sampanmangio and Kudat harbour 126–149

CHAPTER VII

West coast of Balabac island and West coast of Palawan from Cape Buliluyan to North-west head. . . 150–167

CHAPTER VIII

West coast of Palawan—North-west head to Cabul iisland . 168–196

CHAPTER IX

Palawan passage, and the Dangerous ground between it and the main route through the China sea; the North coast of Linapacan, and the West coasts of the Calamian group and Mindoro 197–214

CHAPTER X

West coast of Luzon, from Cape Santiago to Manila, including Manila bay 215–225

CHAPTER XI

West coast of Luzon, from Manila to San Fernando harbour, including Lingayen gulf 226–246

CHAPTER XII

West coast of Luzon, from San Fernando harbour to Cape Bojeador; also reefs in the northern part of the China sea 247–260

APPENDICES

I.—List of ports available for under-water repairs . 261
II.—List of principal ports, showing particulars of depths, etc. 262
III.—List of spots suitable for magnetic observations . 263

Index 265

Digitized by Google

LIST OF VIEWS

	ON OR FACING PAGE
Badas eilanden	42
Cape Melville lighthouse	42
Cabra lighthouse	42
Cape Santiago lighthouse	42
Sueste point lighthouse	42
Capon Grande lighthouse	42
Palauig point lighthouse	42
San Fernando point lighthouse	43
Cape Bolinao lighthouse	43
Cape Bojeador lighthouse	43
Pedjantan	44
Tokong Kemudi	45
View, in two parts, of Tambelan eilanden from Rodger rock	46
View, in two parts, of Tambelan eilanden from Karang Laut	46
View, in two parts, of Groot Natuna eilanden from southward	59
Sungei Ulu entrance	59
View, in two parts, of the northern approach to Reede Pontianak	72
Approach to Sungei Saráwak from north-eastward	73
Timahobe, bearing 096°	77
Groote Sambas rivier entrance, bearing 040°, about 20 miles.	80
Three views of the southern approach to Victoria harbour, Labuan :—	
(1) View, in two parts, from westward of Pelong rocks	112
(2) View from east-south-eastward of Rusukan besar	112
(3) View from about 5 miles south-south-westward of the entrance	112
Southern approach to Tega channel	128
Pulau Tega from north-eastward	128
West-south-western approach to Jesselton harbour	129
Pulau Gaya from westward	129

Digitized by Google

ON OR FACING PAGE

North-western approach to Gaya bay 134

Jesselton harbour from northward 134

View, in two parts, of north-western approach to Ambong bay . 135

Approach to Usukan bay from westward 140

Approach to Usukan bay from one mile northward of Pulau Usukan 140

Approach to Usukan bay from northward 140

Mantanani islands 141

Two views of north-western end of Borneo 141

Western approach to Balabac strait 150

View, in four parts, of the west coast of Palawan, from Victoria range to Bulanjao range 151

View, in two parts, of the west coast of Palawan, from Ulugan bay to Apurauan 166

Four Peaks range from north-westward 166

West coast of Luzon. Tabones islands from north-westward . 230

West coast of Luzon. Capones islands from south-south-westward 230

Capon Grande lighthouse, bearing 144°, about 20 miles . . 230

West coast of Luzon from westward 231

North-western extremity of Luzon from north-westward. . 231

Digitized by Google

GLOSSARY

OF A FEW TERMS IN THE MALAY LANGUAGE TO BE FOUND IN ADMIRALTY PUBLICATIONS

Malay	*English*	*Malay*	*English*
Ayer	Water	Labuan	Anchorage
		Laut	Sea
Baharu	New		
Barat	West	Muara	Mouth of a river
Batang	River		
Batu	Rock, stone		
Besar	Large, great		
Beting	Shoal, sand	Negri	Town
Burung	Bird	Nusa	Island
Bukit	Hill		
		Panjang	Long
Darat	Coast, land	Pasir	Sand
		Pisang	Banana
		Prau, prahu	Boat, ship
Gunong	Mountain	Pulau	Island
Gusong	Reef of rocks	Putih	White
Itam	Black		
		Salatan	South
		Selat	Channel, strait
		Sungei	River
Jambatan	Mole, jetty		
Kaler	North	Tanjong	Cape, point
Kali	River	Telok	Bay
Kampong	Village	Timur	East
Karang	Coral, coral reef	Tokong	Reef, rock
Kechil	Little, small	Trumbu	Dangerous hidden shoal
Kidul	South		
Kuala	Mouth of a river	Trusan	Channel

Digitized by Google

Digitized by Google

SYSTEM OF ORTHOGRAPHY.

The following rules for the spelling of geographical names (termed the R.G.S. II system) have been adopted for British official use, and the names in Admiralty Hydrographic publications will be rendered in accordance with these rules as opportunity occurs.

In new editions of the various volumes of sailing directions names are, generally speaking, given in accordance with these rules, but where the name on the chart shows an older rendering of a name, such chart name is given in brackets after the new rendering and will also be given in the Index.

The rules for spelling in the R.G.S. II system are as follows:—

(1) The spelling of every place-name in an independent country or self-governing dominion using the Roman alphabet (including "Roman" alphabets containing extra or modified letters, such as Czech, Serb-Croat, Polish, Romanian, &c.) shall be that adopted by the country or dominion.

(2) In colonial possessions the spelling of such place-names as belong to languages coming under Rule (1) will be spelt in accordance with that rule.

(3) The accents and diacritical marks in official use by the above countries will be retained. Wherever it appears desirable, the pronunciation will be shown by giving the name as transliterated on the system below.

(4) All other place-names throughout the world will be spelled in general accordance with the following system.

The broad features of this system are—

(*a*) That vowels are pronounced as in Italian and consonants as in English:

(*b*) That every letter is pronounced, and no redundant letters are used.

This system aims at giving a close approximation to the *local* pronunciation; but it is recognised that in some languages, notably Russian, Greek, and Arabic, the necessity for letter-for-letter transliteration often renders this impossible.

Digitized by Google

TABLE OF SPELLING AND PRONUNCIATION R.G.S. II.

a	The long and short Italian vowels, as in *lāvā* ..	Somāli; Rāvennā.*
ä	Between *a* in *fat* and *e* in *eh*?; chiefly in Teutonic and Finno-Ugrian languages	Mähring; Pärnu.
ai	The two Italian vowels, frequently diphthongal, almost as in *aisle*; but pronounced *ei* and *ĕ* in Greek names	Wadai; Shanghai.
au	The two Italian vowels; frequently diphthongal; almost as *ou* in *out*	Sakau; Bauchi.
aw	When followed by a consonant, or when terminal, as in *awl, law*	Dawna; Saginaw.
b	As in English.	
c	Not to be used, but always replaced by *k* or *s*; except in the compound *ch*, and in many conventionally-spelt words, as	Kandahar; Serang. Calcutta; Celébes.
ch	As in *church*; never *tch* or *tsch* for this sound ..	Chad; Kerch.
d‡	As in English.	
dh	Soft *th* as in *they*; a slight *d* sound sometimes preceding it in Semitic languages	Hadhramaut; Riyadh.
e	Long as in *eh*? short as in *bet*. (For the *e* sound in the French *je*, see note at end on the "neutral vowel.")	Gĕlo; Mafĕking.*
(ee)	Used for *i* (*q.v.*) only in a few conventional names	Darjeeling; Keelung.
ei	The two Italian vowels, frequently diphthongal as in *rein*, but pronounced *i* in Greek names ..	Beirut; Raheita.
(eu)	Not used as a single sound.	
f	As in English; *ph* must not be used for this sound	Mustafa; Maidan-i-Naftun.
g	Hard, as in *get, gift*: never as in *gem, gin* ..	Gedáref; Gilgit.
gh	Soft guttural, the Arabic *ghain*	Ghadames; Baghdad.
h	Used only when sounded; or in the compounds *ch, dh, gh, hh, sh, th, zh*	Ahmadabad; 'Abdullah.
i	Long as in *marine*; short as in *piano*	Fiji; Kibonde.
j	As in English; except in transcription of Chinese, where it equals *zh*, or the French *j*	Juba, Ujiji (Eng. *j*); but Jaoping (Fr. *j*).
k	As in English; hard *c* should never be used (except in conventionally-spelt words)—thus, not Corea, Cabul, but	Korea; Kabul.
kh	Hard aspirated guttural, as in the Scottish *loch* (not as in *loch*)	Khan; Sebkha.
l‡ **m** **n**‡	As in English.	

*The long and short symbols given here are merely for explanation, not for use.

‡See note at end on *Liquid sounds*.

Digitized by Google

ng	Has three separate sounds, as in *vanguard*, *finger*, and *singer*. If necessary to distinguish, a hyphen may be placed, as in *van-guard*, *singer*-.. ..	In-galla; Bongo; Ng-ami; Tong-a.
ngg	May be used for the sound of *ng* as in *finger* ..	Trengganu; Yanggang-a.
o	Long as in *both*¶: short as in *rotund*	Kigōma; Hŏnŏlulu.*
ō	As in German; equals the French *eu* in *peu*; or nearly the English sound in *fur*	Barkōl.
(oo)	Used for *u* (*q.v.*) only in a few conventional names, chiefly Indian and Chinese	Poona; Foochow.
oi	The two Italian vowels; frequently diphthongal as in *oil*, but pronounced like *i* in *fit* in Greek names	Hanoi.
ōi	The diphthong as in French *oeil* and Norwegian *hōi*	Hōiland.
ou	Dissyllabic, and not as French or English *ou*, except in Greek names where it has the French value	Zlatoust; Yarouа.
ow	Used as a diphthongal combination of *ō* and *w* only in the romanisation of Chinese	Hankow.
p	As in English.	
ph	As in *loophole*; not to be used for the *f*-sound, except conventionally	Chemulpho; Haiphong.
q	Represents *only* the Arabic *qaf* and the Hebrew *qof*; i.e. a guttural *h* (as a rule)	Qena; Qiryath.
qu	Should never be employed to represent the sound of *hw*; thus, not Namaqua, Quorra, but	Namakwa; Kworra.
r	As in English; should be distinctly pronounced.	
s‡	As English *ss* in *boss*, not as in *these* or *pleasure*	Burgos; Masikesi.
sch	As in *discharge*	Peschanka.
sh **t‡**	As in English.	
th	Hard *th* as in *thick*, not as in *this* (except conventionally in Fijian)	'Athlith; Thingvellir.
u	Long as in *rude*, or as *oo* in *boot*; short as in *pull*	Zūlū; Rūanda.*
ü	As in German: equals the French *u*, as in *tu* (Fr.)	Üskūdar.
v **w** **x**	As in English.	
y	Always a consonant, as in *yard*; it should not be used as a terminal vowel, *e* or *i* being substituted; e.g. not Kwaly or Wady, but	Kikuyu; Maya. Kwale; Wadi.
z	As in *gaze*, not as in *azure*.	
zh	As the *s* in *treasure*, the *z* in *azure*, or the French *j* in *je*; but for the sound in Chinese use *j* (*vide* note about under *j*)	Zhob.

*The long and short symbols given here are merely for explanation, not for use.
‡See note at end on *Liquid sounds*.
¶The true Italian ō is broader than this; almost as in *broth* (=R.G.S. II *aw*). The letter *o* is conventionally used for this sound in certain names in Nigeria, Tonga, &c.: e.g. Oyo, Fofoa.

Digitized by Google

NOTES.

The doubling of a vowel or a consonant is only necessary when there is a distinct repetition of the single sound, and should otherwise be avoided	Nuusafee; Moorea; Jidda; Muhammad.
Accents should not generally be employed; but in order to indicate or emphasise the stress, an acute accent may be used	Saráwak; Qántara; Tong-atábu; Paraná,
A long or short mark over a vowel (e.g. ā, ŏ) should only be used (and that sparingly) when without it there would be danger of mispronunciation ..	Kūt; Kyōto; Abŏso.
Hyphens will not be used except to indicate pronunciation and with the particle *-i-* (in Persian, Fijian, &c.)	Ta-if; Pusht-i-Kuh; Nuku-i-Ra.

Inverted comma and apostrophe.—The inverted comma ' is employed only to represent the Arabic *'ain*, the Maltese *'għain*, and the Hebrew *'ayin*. The apostrophe ' in foreign words indicates a liquid sound (*see* below).

Liquid sounds.—The occasional "liquid" or "palatalised" sound of *d*, *l*, *n* *s*, *t*, &c. (as in *d'you*, *lure*, *new*, *pursue*, *tune*, &c.) is as a rule sufficiently represented by a following *y*; where, however, owing to a following consonant, or to the palatalised letter coming at the end of a word, the *y* is inapplicable, the liquid sound will be represented by an apostrophe, thus: *d'*, *l'*, *n'*, *s'*, *t'*, &c.

The "Neutral vowel."—The "indeterminate" or "neutral" vowel sound (*ər*), i.e. the sound of *a* in *marine*, *e* in *often*, *i* in *stir*, *io* in *nation*, *o* in *connect*, *ou* in *curious*, *u* in *difficult*, &c., *e* in French *je*, or the often unwritten vowel (*Fat-ha*) in Arabic, &c., is represented as a rule by *a*: as in Basra, Hawiya; but sometimes by *e*, when the sound approximates more to *e* than to *a*; as Meshed, El Gezira.

(In any guide to pronunciation issued by the Permanent Committee on Geographical Names, the "neutral vowel" is represented generally by the italic *e*: occasionally also by italic *a* or *u*.)

This sound must not be confused with *e-mute*, where the *e* is not sounded at all: as in Abbeville.

Nasal vowels.—In illustrating the pronunciation of French, Portuguese, Polish, &c., nasal vowels, the nasalisation will be represented by italic *n*; as Częstochowa pr. Chānstokhóva.

Note.—The Royal Geographical Society has published a book entitled "Alphabets of Foreign Languages transcribed into English according to the R.G.S. II system." This book enables the correct rendering of names to be obtained, also of names in languages which are transliterated letter for letter.

Digitized by Google

INFORMATION RELATING TO ADMIRALTY CHARTS AND PUBLICATIONS, GENERAL NAVIGATION, AND GENERAL METEOROLOGY.

ON THE CORRECTION OF ADMIRALTY CHARTS.

Guides to Navigation.—In addition to the charts, the navigational publications which are primarily affected by the continual changes and alterations that take place are the Admiralty Sailing Directions, the Admiralty List of Lights, Fog Signals and Visual Time Signals, and the Admiralty List of Radio Signals. The Admiralty Notices to Mariners contain information mainly for the correction of the charts and navigational publications.

CHARTS.

1. **Degree of Reliance.**—It should be clearly understood that the value of a chart depends on the character of the original survey and on the completeness of the reports of subsequent changes. The remarks on "The Use of Charts as Navigational Aids, &c.", which are subjoined, should be carefully studied in this connection.

2. **System of Dating and Issue of Corrected Copies.**— Admiralty charts after first publication are kept corrected by means of new editions, large corrections, and small corrections. Copies of charts issued by the Hydrographic Supplies Establishment, Admiralty Chart Agents or Admiralty Chart Depôts are corrected, except from temporary and preliminary Notices to Mariners, for all navigational information to the date of issue.

New Charts.—The date of publication of a chart is shown outside the bottom margin, in the middle, e.g. :—

Published at the Admiralty 30th May, 1947.

New Editions.—When a chart is revised throughout and modernised in style a new edition is published, the date being shown outside the bottom margin and to the right of the date of publication, e.g. :—

New Edition 2nd Jany., 1947.

All large and small corrections notations are at the same time erased, and all old copies of the charts are cancelled.

Large Corrections.—When a chart is corrected from important information which is too comprehensive to promulgate by Admiralty Notice to Mariners or to insert conveniently by hand on existing copies, but when the chart is not revised throughout, the date on which these corrections are made is shown on the chart outside the bottom margin and to the right of the date of publication, and in the case of a chart already marked with a new edition date, below such date, e.g. :—

Large corrections 10th Feb., 1947.

Digitized by Google

All small corrections notations are at the same time erased, and all copies of the chart are cancelled.

Small Corrections.—

(*i*) When a chart is corrected from the information promulgated in an Admiralty Notice to Mariners (except temporary and preliminary Notices), the year, if not already shown, and number of the notice are entered in the bottom left-hand corner of the chart, e.g. :—

Small corrections **1947–*903*.**

Copies of the chart stocked by the Hydrographic Supplies Establishment, Admiralty Chart Agents and the Admiralty Chart Depôts are corrected by hand from such information.

(*ii*) When a chart is corrected from information which is considered of no importance from the standpoint of safe navigation, and which is, therefore, not promulgated in an Admiralty Notice to Mariners, the year, if not already shown, and date of the correction are entered on the chart, in one of two ways, in the bottom left-hand corner below the margin and in sequence with the notations referred to in the preceding paragraph, e.g. :—

Small corrections, 1947—5.20—

or Small corrections 1947—(VI.*25*)

These indicate that the chart received minor corrections on the 20th May or 25th June, respectively.

In such cases copies of the chart held by ships and establishments are not usually replaced by new copies, but in exceptional cases, e.g., when new compasses are inserted, new copies of the charts may be supplied. It should, however, be particularly noted that the absence of corrections represented by square or bracket dates from a chart does not invalidate it for navigation.

3. Correction of Charts in Ships.—All small but important corrections affecting navigation that can be made to the charts by hand are promulgated in Admiralty Notices to Mariners and, with the exception of corrections from temporary or preliminary Notices, should at once be neatly made in waterproof violet ink on the charts affected, the year (if not already shown) and numbers of the notices being inserted, also in waterproof violet ink, in the bottom left-hand corner of the chart. The recognised abbreviations shown on Admiralty chart No. 5011 ("Signs and abbreviations used on Admiralty Charts") should be used.

Generally speaking, the amount of information which should be inserted on a chart should be in accordance with that already shown.

On large-scale charts, the abridged descriptions, as shown on chart No. 5011, of all details of all lights, light-buoys and fog signals, and the year dates of obstructions, reported shoals, dredged channels, depth on bars or in shifting channels, and irregularities of lights, should be inserted.

On coastal charts, the abridged descriptions of only the principal lights and fog signals, i.e., those to assist in approaching or making the land, should be inserted.

Digitized by Google

Particulars of such lights should be omitted, in the following order, as the scale of the chart decreases, viz. :—

(i) Elevation, (ii) Period, (iii) Number in Group, and (iv) Visibility.

Particulars of fog signals should be inserted in their appropriate positions if space permits, but should otherwise be entered in a tabulated list under the title or some other convenient place on the chart.

Inner harbour light-buoys and beacons should not be inserted on coastal charts, and against other light-buoys only the character of the light should be inserted.

On ocean charts, lights which are visible 15 miles or over should alone be inserted and then only their character and colour.

On all charts, writing should be inserted as much as possible clear of the water, unless the relative objects are on the water, and care should be taken not to obliterate any information already on the chart. When cautionary or tidal notes, &c., are inserted, they should be written in a convenient but *conspicuous* place, preferably near the title, where they will not interfere with other details.

Erasures should never be made but the details should, when necessary, be crossed through in waterproof violet ink.

Admiralty Notices to Mariners are occasionally accompanied by reproductions of portions of charts (known as " blocks "), and when correcting charts from such blocks the following points should be borne in mind :—

(i) A block may not only indicate the insertion of new information, *but also the omission of matter previously shown.* The latter would, however, invariably be mentioned in the text of the Notice, and the fact that a block accompanies a Notice should not cause the text of the Notice to be disregarded.

(ii) The limiting lines of a block are determined for convenience of reproduction and need not be adhered to when cutting out for pasting on the chart, provided that the point mentioned in the preceding paragraph is taken into consideration.

(iii) The new information shown on a block can sometimes be inserted on the chart by hand, the reason for issuing a block in such a case being to avoid a long description of the new information in the text of the Notice.

(iv) Owing to distortion the blocks do not always fit the charts exactly, care should therefore be taken when pasting a block on to a chart that the more important navigational corrections fit as closely as possible. This can best be assured by fitting the block while it is dry and making two or three pencil ticks round the edges for use as fitting marks after the paste is applied.

Corrections from Temporary or Preliminary Notices to Mariners should be inserted on the charts *in pencil* and the year and number of the notice should be shown against them, e.g. :—N.M. 625/1947 temp., and also in the bottom left-hand corner of the chart, in pencil, *below* the small corrections notations (*see* above). Temporary corrections should be rubbed out when the notice is received cancelling them, but preliminary corrections should be inked in when the notice is received reporting that the changes have been made.

Digitized by Google

Charts stocked by the Hydrographic Supplies Establishment, Admiralty Chart Agents and the Admiralty Chart Depôts are *not* corrected from Temporary or Preliminary Notices to Mariners, and when charts are received from one of these sources they should be corrected in pencil as necessary from the copies of such Notices already held, or from those supplied with the charts.

Corrections from Radio Navigational Warnings concerning derelicts and drifting obstructions, the temporary extinction of lights, displacement of important aids to navigation, ice reports, &c., should also be noted *in pencil*, as received, on the charts affected. Radio Navigational Warnings of a permanent nature and those relating to derelicts and drifting obstructions dangerous to navigation are re-issued in the form of Admiralty Notices to Mariners, but other warnings are not re-issued in this way, except in special circumstances.

Corrections from information received from authorities other than the Admiralty should be noted, *in pencil*, on the charts affected, but no charted danger is to be expunged without the authority of the Hydrographer of the Navy.

NAVIGATIONAL PUBLICATIONS.

1. Admiralty Sailing Directions, Supplements, &c.—The Admiralty Sailing Directions, consisting of about 73 volumes for the whole world, contain general information useful to the navigator.

An index chart bound near the beginning of each volume shows the area dealt with and the serial numbers and limits of all Admiralty charts for the area which were published *when the volume was printed.*

Each volume is periodically revised throughout, and, in the intervals between the publication of new editions, Admiralty Notices to Mariners and Supplements are published to enable the volume to be corrected. It should, however, be clearly understood that Sailing Directions cannot be correct in all minor details after the date of the latest Supplement.

The above-mentioned corrections are not made in the Sailing Directions stocked by the Hydrographic Supplies Establishment, Admiralty Chart Agents or the Admiralty Chart Depôts.

A new edition of each volume of Sailing Directions is published at intervals of approximately from ten to twelve years. The number of the latest Admiralty Notice to Mariners used in its compilation is given in the "Advertisement" on page iii of each volume, and the numbers of the Notices affecting it between the dates of going to press and issue to ships and establishments are given in the Notice announcing its publication, to enable the new edition to be corrected before being brought into use.

A Supplement to each volume is generally published annually, each succeeding Supplement cancelling the former. When a volume is taken up for revision, however, no further Supplement to that edition is issued, but subsequent Notices to Mariners affecting it are summarised each year and issued as a separate publication, until the new edition of the volume is published.

A tabular form for notation of the existence of Supplements and Summaries of Notices is printed on the front fly-leaf of all Sailing Directions, and these notations are made as necessary in all copies issued by the Hydrographic Supplies Establishment and the Admiralty Chart Depôts.

Supplements and Summaries of Admiralty Notices to Mariners should be retained intact. *Whenever reference is made to the Sailing*

Digitized by Google

Directions, the Supplement and, where applicable, the Summary must be consulted. The existence of a Supplement or Summary of Admiralty Notices to Mariners is to be entered in the tabular form inside the cover of the Sailing Directions. Matter appearing in the Supplements for the first time is indicated by marginal lines or underlining and deletions from the previous Supplement are indicated by brackets.

Admiralty Notices to Mariners affecting Sailing Directions *are not* to be cut up and pasted in, but the book is to be annotated in the margin, or corrected in manuscript, as convenient.

2. The Admiralty List of Lights, Fog Signals and Visual Time Signals.—The Admiralty List of Lights, Fog Signals and Visual Time Signals for the world is issued in twelve volumes divided geographically as shown on the index chart at the beginning of each volume.

Light-buoys are *not* included in the list.

The volumes are published annually at the rate of one volume per month commencing with Volume 1 in January and ending with Volume 12 in December. Supplements to these volumes will not be issued.

Each volume will be issued with an inscription on its cover and title page stating the date to which the volume has been corrected, which will be approximately six weeks prior to the date of its issue. Permanent and temporary corrections or additions to each volume, which may occur between the date of correction and date of issue, will be promulgated by Section III of Admiralty Notices to Mariners.

Amendments.—Important amendments are promulgated in Admiralty Notices to Mariners. In Section IIIA of each Weekly Complete Edition of these Notices will be found all additions and alterations made to Lights, Fog Signals and Visual Time Signals by the Notices issued during the week affected; certain other additions and alterations are also included in Section IIIA, which, though not of sufficient importance to necessitate the issue of a Notice to Mariners, will be found of use to the seaman. Section IIIB contains similar information but of a temporary character.

Corrections to the Light Lists should be made in pencil, or extracted from Section III and pasted in the appropriate volume.

Note.—Corrections are not made in copies of the Lists of Lights, &c., stocked by the Hydrographic Supplies Establishment, Admiralty Chart Agents or the Admiralty Chart Depôts, and copies received from these sources should accordingly be corrected from the weekly editions of the Notices to Mariners before being brought into use.

3. The Admiralty List of Radio Signals.—The Admiralty List of Radio Signals is issued in three volumes.

Volume I.—Communications—Comprises particulars of radiotelegraph coast stations, together with general regulations; it also includes such subsidiary services as medical advice supplied by radio, together with details of the organisation for transmitting British official messages to merchant ships.

Volume II.—Navigational Aids—Comprises particulars of services from direction-finding stations, radiobeacons, and radio navigational aids (position fixing systems) together with radio time signals and navigational warnings (with ice signals); all relevant codes and regulations will be found in this volume.

Volume III.—Meteorological Services—Comprises particulars of weather services provided for the use of shipping, together with relevant codes and lists of meteorological observation stations.

Digitized by Google

New editions of each volume will normally be published annually.

A Supplement to each volume is also issued. These Supplements embody corrections subsequent to the date of going to press and are issued gratis with each volume. All corrections later than those included in the Supplements are promulgated in Section VI of the complete weekly edition of Admiralty Notices to Mariners.

Copies of the List stocked by the Hydrographic Supplies Establishment, Admiralty Chart Agents or the Admiralty Chart Depôts are not kept corrected, and Lists received from these sources should accordingly be corrected from the Supplements and from the weekly editions of the Admiralty Notices to Mariners before being brought into use.

4. The Admiralty Tide Tables.—The Admiralty Tide Tables are published in three sections as follows:—

For "HOME WATERS (British Isles, Europe and north coast of Africa)."

For "ATLANTIC AND INDIAN OCEANS."

For "PACIFIC OCEAN AND ADJACENT SEAS."

Each section contains two parts, Part I giving tidal predictions for Standard Ports and tidal stream predictions for certain straits and channels, Part II giving data for predicting tides at places which are not Standard Ports.

Admiralty Tide Tables, Part III, contains instructions for predicting tides and tidal streams, and for analysing observations of tides and tidal streams, with tables to assist prediction and analysis.

THE USE OF CHARTS AS NAVIGATIONAL AIDS AND GENERAL REMARKS RELATING TO PRACTICAL NAVIGATION.

(1) Reliance on a chart.—The value of a chart must manifestly depend upon the accuracy of the survey on which it is based, and this becomes more important the larger the scale of the chart.

To estimate this the date of the survey, which is always given in the title, is a good guide. Besides the changes that, in waters where sand or mud prevails, may have taken place since the date of the survey, the earlier surveys were mostly made under circumstances that precluded great accuracy of detail, and, until a plan founded on such a survey is tested, it should be regarded with caution. It may, indeed, be said that, except in well-frequented harbours and their approaches, no surveys yet made have been so minute in their examination of the bottom as to make it certain that all dangers have been found. The fullness or scantiness of the soundings is another method of estimating the completeness of a chart. When the soundings are sparse or unevenly distributed, it may be taken for granted that the survey was not in great detail.

It appears to be insufficiently realised that the degree of reliance which may reasonably be placed upon an Admiralty chart, even in surveys of modern date, is mainly dependent on the scale on which the survey was made. The scale for publication is now generally that of the original survey, except in the case of coast sheets which are sometimes reduced. It should not, therefore, be assumed that the original survey was made on a larger scale than that published.

It must be borne in mind that the principal method of ascertaining

Digitized by Google

the inequality of the bottom of the sea is by the laborious process of sounding, and that in sounding over any area, the boat or vessel obtaining the soundings is kept on given lines; that each time the lead descends, or a sonic sounding is taken, the depth over only a small area is obtained, in the case of the lead, it has a diameter of only a few inches, and that consequently each line of soundings, though miles in length, is only to be considered as representing a narrow width.

Surveys are not made on uniform scales, but each survey is made on a scale commensurate with its apparent importance. For instance, a general survey of a coast which vessels only pass in proceeding from one place to another is not usually made on a scale larger than one inch to the nautical mile, while surveys of areas where vessels are likely to anchor are made on a scale of three inches to the mile, and surveys of frequented ports or harbours likely to be used by fleets, on a scale of from six inches to ten inches to the nautical mile.

Close examination by sounding is the only method by which surveys on a large scale can be made, and in view of the vast mileage of surveys yet requiring completion in the interests of navigation, it would be a waste of time to undertake large scale coast surveys.

The scale on which a survey is to be conducted having been settled, it is manifestly superfluous to obtain more lines of soundings than can be represented on the paper. 100 soundings, which is the maximum number that can be placed with clearness on every square inch of paper, means that on a scale of one inch to the mile each sounding on the chart occupies an area representing eight acres of actual ground, whilst on a scale of six inches to the mile each sounding represents an area of a little less than a quarter of an acre, i.e., of 100 feet square.

The following diagram represents as many soundings as can be placed legibly on a square inch of paper:—

16	15	15	13	13	14	12	11	10	9
14	15	14	14	13	13	12	11	9	8
15	15	14	17	16	14	13	10	10	9
16	16	17	18	16	12	11	8_8	9	10
18	17	15	12	9	7_3	7_4	7_4	9	10
19	16	12	9	5_3	4_4	5_4	6_4	8_3	9
22	19	16	10	3_4	5_1	6_1	7_3	8_3	10
20	16	12	7_1	5_4	6_1	6_4	7_1	8_3	10
18	15	11	9	7_3	7	7_3	8_3	10	11
20	17	14	11	12	10	9	10	11	13

Little assistance in detecting excrescences on the bottom is afforded by the eye, when sounding in a boat, even in clear water, on account of the observer being within five feet of the surface; none in turbid seas. If, therefore, there is no inequality in the soundings to cause suspicion, a shoal patch between two lines may escape detection.

Thus, in a chart on a scale of one inch to the mile, an inequality of some acres in extent rising close to the surface, if it happened to be situated between two lines, might escape detection; whilst in a chart on a scale of 6 inches, inequalities as large as battleships, if lying parallel with, and between the lines of soundings, might exist without detection if they rose abruptly from an otherwise even bottom.

General coast charts should not, therefore, be looked upon as infallible, and a rocky shore should on no account be approached within the ten-fathom contour line, without taking every precaution to avoid a possible danger; and even with surveys of harbours

Digitized by Google

on a scale of 6 inches to the mile vessels should avoid, if possible, passing over charted inequalities in the ground, as some isolated rocks are so sharp that the lead may not find the highest part. Better results can, however, be obtained by sonic sounding owing to the rapidity with which such soundings can be taken, but even this method will not find rocks unless the boat or vessel be directly over them.

Blank spaces among soundings mean that no soundings have been obtained in these spots. When the surrounding soundings are deep it may with fairness be assumed that in the blanks the water is also deep; but when they are shallow, or it can be seen from the rest of the chart that reefs or banks are present, such blanks should be regarded with suspicion.

Soundings in hair line, which are shown on the latest charts in upright figures, and on other charts in sloping figures, indicate that such soundings have been taken from smaller scale charts, an unreliable source, or adapted from old and imperfect surveys.

(2) **Fathom lines a caution.**—Except in plans of harbours that have been surveyed in detail, the six-fathom line on most Admiralty charts is to be considered as a caution or danger line against unnecessarily approaching the shore or bank within that line, on account of the possibility of the existence of undiscovered inequalities of the bottom, which nothing but an elaborate detailed survey could reveal. In general surveys of coasts or of little frequented anchorages, the necessities of navigation do not demand the great expenditure of time required for such a detailed survey. It is not contemplated that ships will approach the shore in such localities without taking special precautions.

The ten-fathom line is, on rocky shores, as before mentioned, another warning, especially for ships of deep draught.

Charts on which no fathom lines are marked must be especially regarded with caution, as it generally means that soundings were too scanty and the bottom too uneven to enable them to be drawn with accuracy.

Isolated soundings, shoaler than surrounding depths, should always be avoided as there is no knowing how closely the spot may have been examined.

(3) **Chart on largest scale always to be used.**—It sometimes happens that from press of work, only the copper plate of the larger scale chart of a particular locality can at once receive any extensive re-arrangement of coastline or sounding. This is an additional reason, besides the obvious one of the greater detail shown, why this largest scale chart should always be used for navigating.

(4) **Caution in using small-scale charts.**—In approaching the land or dangerous banks, regard must always be had to the scale of the chart used. A small error in laying down a position means only yards on a large-scale chart, whereas on a small scale the same amount of displacement means large fractions of a mile.

For the same reason bearings to near objects should be used in preference to objects farther off, although the latter may be more prominent, as a small error in bearing or in laying it down on the chart has a greater effect in misplacing the position the longer the line to be drawn.

(5) **Graduation.**—All plans are now being graduated in skeleton style before publication in order to facilitate easy reference to astronomical positions; previously published plans are also graduated as

Digitized by Google

opportunity offers. The graduation is, however, of necessity often based upon imperfect information of a conflicting nature; for this reason, whenever an astronomical position is quoted other than approximate (i.e., when seconds are given), it is necessary to quote also the number of the particular chart from which the position has been derived.

In this connection it is pointed out that, whenever possible, a position should be transferred from one chart to another by bearing and distance from a distinguishing feature common to both, such as a point of land or a light, &c., and not by the graduation which may differ owing to one of the charts being constructed on later and more complete astronomical data than the other.

(6) Distortion of printed charts.—The paper on which charts are printed is, from various causes, subject to distortion, but the effect of this is seldom sufficient to affect navigation. It must not, however, be expected that accurate series of angles taken to different points will always exactly agree when carefully plotted upon the chart, especially if the lines are to objects at some distance. The larger the chart the greater the amount of this distortion.

(7) Buoys.—It is manifestly impossible that any reliance can be placed on buoys always maintaining their exact position. Buoys should, therefore, be regarded as warnings and not as infallible navigating marks, especially when in exposed positions; and a ship should always, when possible, be navigated by bearings of fixed objects on shore or angles between them, and not by buoys.

(8) Light-buoys.—The lights shown by light-buoys cannot be implicitly relied on, as, if *occulting* or *flashing*, the apparatus may get out of order, or the light may be altogether extinguished. These lights in the British isles are from 5 to 217 candle-power.

(9) Cable-buoys.—Cable-buoys marking the ends of submarine cables usually are spherical or can shaped, surmounted by a globe and occasionally a flag. Below the topmark two *white fixed* lights, disposed horizontally, may be exhibited, but they cannot be implicitly relied on.

(10) Lights.—Arcs drawn on charts round a light are not intended to give information as to the distance at which it can be seen, but solely to indicate, in the case of lights which do not show the same characteristics or colours in all directions, the bearings between which the differences occur.

All the distances given in the Admiralty List of Lights and on the charts for the visibility of lights are calculated for a height of an observer's eye of 15 feet. The table of distances visible due to elevation, at the beginning of each volume of the Admiralty List of Lights, affords a means of ascertaining how much more or less the light is visible should the height of the eye be more or less. The glare of a powerful light is often seen far beyond the limit of visibility of the actual rays of the light, but this must not be confounded with the true range. Again, refraction may often cause a light to be seen farther than under ordinary circumstances.

When looking out for a light at night, the fact is often forgotten that from aloft the range of vision is much increased. By noting a star immediately over the light a very correct bearing may be afterwards obtained from the compass.

The intrinsic power of a light should always be considered when expecting to make it in thick weather. A weak light is easily obscured by haze, and no dependence can be placed on its being seen.

Digitized by Google

The power of a light can be estimated by remarking its candle-power, as given in the Admiralty List of Lights, and in some cases by noting how much its visibility in clear weather falls short of the range due to the elevation at which it is placed. Thus, a light standing 200 feet above the sea, and only recorded as visible at 10 miles in clear weather, is manifestly of little brilliancy, as its elevation would permit it to be seen over 20 miles, if of any power. (*See* table in the Admiralty List of Lights.)

The distance from a light cannot be estimated either by its brilliancy or its dimness.

On first making a light from the bridge, by at once lowering the eye several feet and noting whether the light is made to dip it may be determined whether the vessel is in the circle of visibility corresponding with the usual height of the eye or unexpectedly nearer the light.

(11) **Fog signals.**—Sound is conveyed in a very capricious way through the atmosphere. The following points in regard to fog signals should be borne in mind :—

(*a*) Fog signals are heard at greatly varying distances.

(*b*) Under certain conditions of atmosphere, when an air fog signal is a combination of high and low tones one of the notes may be inaudible.

(*c*) There are occasionally areas around a fog signal in which it is wholly inaudible.

(*d*) A fog may exist a short distance from a station and not be observable from it, so that the signal may not be sounded.

(*e*) Some fog signals cannot be started at a moment's notice after signs of fog have been observed.

Mariners are therefore warned that fog signals cannot be implicitly relied upon, and that *the practice of sounding should never be neglected.* Particular attention should be given to placing "Look-out men" in positions in which the noises in the ship are least likely to interfere with the hearing of the sound of an air fog signal ; as experience shows that, though such a signal may not be heard from the deck or bridge when the engines are moving, it may be heard when the ship is stopped, or from a quiet position. It may sometimes be heard from aloft though not on deck.

Great assistance may be obtained from radio beacons at many important lighthouses and light-vessels, but the attention of Mariners is called to the serious dangers which may arise from their misuse. No attempt should be made to approach such a position on a radio bearing, whilst relying only on hearing the sound fog signal in sufficient time to alter course to avoid danger. When the radio fog signal is transmitted from a light-vessel, it is essential in order to avoid collision, that the bearing from the light-vessel should not be kept constant.

(12) **Tides.**—In navigating coastal waters where the range of the tide is considerable, caution is always necessary. The tidal predictions for Standard ports in the Admiralty Tide Tables can generally be relied upon to give the times of high and low water to within a few minutes, and heights within a few tenths of a foot. Larger errors are to be expected in the predictions for places which are not Standard ports, computed from the data in Part II, but such predictions computed from the harmonic constants are always sufficiently accurate for the general requirements of navigation. For Standard ports the heights of the tide at times between high and low water may usually be found within narrow limits in accordance with the instructions in Parts I and III of the Tide Tables.

Digitized by Google

The datums of Admiralty charts depending on Admiralty surveys vary with the type of tide, but usually conform with the International agreement, that datum should be " a plane so low that the tide will but seldom fall below it." The datums used by different nations, however, differ very considerably and those of Admiralty charts depending on foreign surveys are always those used by the original surveyors, which vary from " lowest possible low water " to " mean low water " in tidal waters, and are usually mean sea level in non-tidal waters.

The datum used is always stated on large-scale Admiralty charts.

Caution.—Most datums are above the lowest level to which the tide may fall; the charts therefore do not always show minimum depths.

(13) Tidal streams.—Where the tidal streams are semi-diurnal information regarding them is usually given, in a convenient part of the chart, in tabular form or by notes, special symbols being inserted at the positions to which the information refers. In certain cases, where the information available is incomplete, the streams are indicated by means of arrows.

There are many places where the tidal streams cannot be predicted by reference to the tide at a Standard port. Although no data for predicting the times at which they flow is given, their general direction is, in many cases, indicated by arrows on the charts. For a few of the straits and channels, where these conditions exist, tidal stream predictions are given in Admiralty Tide Tables.

Tidal streams, particularly if rotary, may vary considerably both in direction and rate; predictions of the stream must therefore always be considered approximate.

The turn of the tidal stream is not usually coincident with the times of high and low water; in fact, though in estuaries, harbour entrances, &c., the stream usually turns at about the times of high and low water, in open channels, and along open coasts generally, the turn usually occurs more nearly at half tide. Predictions of the times of high and low water must therefore never be used as predictions of the times of slack water.

It should be remembered that, even where the general direction of the stream is parallel with the shore, an indraught is usually experienced when crossing the entrances to bays and inlets.

(14) Fixing positions.—For further information on this subject, *see* Admiralty Manual of Navigation.

When in sight of land, every opportunity should be taken of fixing the ship's position by terrestrial objects.

(*a*) *Simultaneous bearings or angles.*—The most usual method is by compass bearings of suitable objects, and it must be borne in mind that a fix by only two bearings is liable to error, either an absolute error in taking the bearings, or those made in applying the deviation or in laying the bearings off on the chart. For these reasons, a third or check bearing of some other object should, when possible, be taken, especially when near the shore or dangers. The coincidence of the resulting three lines will prevent any mistakes if the objects are suitably placed.

The position may also be fixed by observing horizontal sextant angles of well-defined suitably placed objects. These angles may be plotted on the chart with a station-pointer. Two conditions are, however, necessary to its successful employment; first, that the objects be well chosen; and, second, that the observer is skilful and rapid in his use of the sextant and station-pointer. For the former,

Digitized by Google

reference can be made to the pamphlet on the use of the station-pointer, or to the Admiralty Manual of Navigation; the latter is only to be obtained by practice.

It will readily be seen that a sextant often offers advantages, as angles can be obtained from any position whence the objects are visible, and the fix is in no way dependent on the compass.

In many narrow waters also, where the objects may yet be at some distance, as in coral harbours or narrow passages among mud banks, navigation by sextant and station-pointer is invaluable, as a true position can only be obtained by its means. A small error in either taking or plotting a bearing under such circumstances may put the ship ashore.

In all cases where great accuracy of position is required, such as the fixing of a rock or shoal, or the addition to a chart of fresh soundings or new buildings, angles should invariably be used. In such cases angles should be taken of a number of objects, five being a good number, since this not only fixes the position beyond doubt, but also affords a useful check on the accuracy of the chart itself. When running a line of soundings it is only necessary to take a third angle every now and then, firstly to make certain that the more important soundings, as at the end of a line, are correctly placed, and secondly to check the general accuracy of the chart.

Sometimes when only one of the selected objects is visible from the compass, a compass bearing of it and a sextant angle to the other may be used to fix the position.

(*b*) *Simultaneous bearing and distance.*—Attention is also directed to the very useful and handy method of fixing by the bearing and distance of a suitable object.

Should the ship be supplied with ranging equipment, its use here is obvious, but without it a very good approximate distance of an object of known height may be obtained by observing its angle of elevation and obtaining its distance from Lecky's Offshore Distance Tables, which are supplied with all sets of charts. Full directions for the use of these Tables are given with them.

(*c*) *The running fix.*—If two position lines are obtained at different times the position of the ship may be found by transferring the first position line up to the time of taking the bearing for the second position line. The point of intersection of the second and the transferred position line is the ship's position at the time of the second observation. The accuracy of this fix will depend on the accuracy of the estimated run (over the ground) between bearings and, therefore, it is essential to take great care that an accurate allowance is made for tidal stream, current, and leeway experienced by the ship during this interval.

The method of fixing by doubling the angle on the bow is useful when passing points of land, &c., in waters where there is either no tidal stream or current, or where this can be estimated with sufficient accuracy.

This method is as follows:—

Suppose that the angle between the ship's head and an object is measured, and found to be X°, and that the time of the observation is noted. Suppose also that the time is again taken when the angle between the ship's head and the object is 2X°. Then, if the course made good is the course steered, the distance of the ship from the object at the time the second bearing was taken is equal to the run (over the ground) in the interval. Hence the ship's position can at once be laid off as a bearing and distance from the object. In practice the angle X should not be less than about 25°.

Digitized by Google

The most useful form of this method, the so-called "four-point" bearing, gives a good fix for a departure, but does not ensure safety, as the point and any dangers that may lie off it are abeam before the position is obtained.

The above fix is reliable when there is no tidal stream or current or when it runs directly with or against the course of the ship. When the stream or current runs across the course of the ship or when leeway is to be allowed for, this method should never be used and the ship's position should be obtained by plotting the two bearings as a running fix.

A table "Distance of an object by two bearings" is supplied with certain chart folios, and is also given in Inman's Tables, by which the ship's position at the second bearing can be found: any two bearings at a suitable angle to each other may be used, together with the run between them, but, again, this table should not be used when the vessel is subject to a cross tidal stream or leeway.

(*d*) *The danger angle.*—The use of the danger angle in passing outlying dangers with land behind them should also not be forgotten.

A vertical danger angle is useful when the danger lies off an object such as a lighthouse, the height of which is known; the angle being obtained from the aforesaid Lecky's Tables. If a horizontal danger angle between two objects is used, however, caution is necessary, as, should the objects not be correctly placed on the chart, the angle taken from it may not serve the purpose. This method should not, therefore, be employed when the survey is old or manifestly imperfect.

(*e*) *The astronomical position line.*—When fixing by astronomical observations, attention is drawn to the great utility of the position line. Even a single position line may at times give invaluable information, as the ship must be somewhere on this line, provided that the chronometer error is accurately known.

A sounding obtained at the same time may often serve to give an approximate position. Again, by steering along, or at a required distance parallel to, a single position line, a vessel may make her port or avoid a danger, although uncertain of her position.

A very accurate position may be obtained by observations of three or more stars at evening or morning twilight, or by the observation of a bright star at daybreak and another shortly afterwards of the sun when a few degrees (not less than 10°) above the horizon. The position lines obtained from the bodies observed should differ in azimuth by 30° or more.

Mariners are also reminded that, with modern tables for correcting the altitude, observations of the moon entail practically no more calculation than those of a planet. Moon sights are sometimes available when stars are obscured by light cloud, &c.; also, an excellent position may frequently be obtained by simultaneous observations of the sun and moon.

(*f*) *The radio position line.*—A number of radio systems, of which the principal ones are M/F D/F, Radio Beacons, Consol Beacons, Loran, Gee and Decca, are now in general use from which position lines or fixes may be obtained.

The accuracy and range which may be obtained from these systems vary considerably; their great advantage over other methods lies in the fact that they can be employed under all weather and visibility conditions, though in some cases the results obtained will vary between day and night.

Digitized by Google

Special receiving equipment is generally required in order to make use of the radio signal, and some systems require special lattice charts or tables for plotting the position lines. Full details of these systems and their coverage areas are contained in Admiralty List of Radio Signals, Volume II.

The mariner should appreciate that with the position-fixing systems the accuracy of a fix will depend on three factors :—

(i) The distance of the observer from the transmitters.

(ii) The bearing of the observer from the base line joining the pair of stations which he is using.

(iii) The angle of intersection of the hyperbolic position lines.

It should be apparent from the inspection of any lattice chart that an inherent small equipment error, or a small personal error that may occur at the receiver, will cause a geographical error of varying amount according to the observer's position.

It is important to realise that accurate equipment is no guard against the vagaries of the propagation of radio waves. The beacons and systems operating on medium and low frequencies are liable to " night error " in areas where the ground and sky waves are received with equal strength ; these areas will occur at ranges depending upon the particular frequency used by any beacon or system. Where the transmissions of two stations are synchronised to provide one signal reading and position line, " night error " will be a minimum along the normal to the base line joining the pair of stations, and a maximum towards the limits of their service sector.

Little is yet known about the effects of hills and discontinuities in the terrain (such as cliffs) on the speed of medium- and low-frequency radio waves.

At the other end of the radio spectrum the transmissions of systems operating on the very high frequencies are subject to distortion in abnormal atmospheric conditions.

(*g*) *Fixing by radar.*—Radar may also be of considerable assistance when navigating in coastal waters in low visibility or at night. It is essential, however, to appreciate the limitations of a radar set when interpreting the information obtained from it. It must be remembered that the radar horizon is only slightly farther than the visual horizon would be, in good visibility, for a height of eye equal to the height of the radar aerial. Hence no echoes will be received from a coastline lying below the radar horizon, while echoes may be received from high ground farther inland which will give a misleading impression of the range of the nearest land.

Depending on the width of its beam, the bearings from a radar set tend to be inaccurate. It is therefore preferable when fixing by radar to use ranges rather than bearings. It is then most important to consider carefully the identity of the object giving the echo, using the bearing as an indication, and the height of the object to determine whether it will appear on the radar presentation. Radar Range Nomograms are useful in deciding this, but a satisfactory result can be obtained by using " Distance to Sea Horizon Tables."

When two or more objects on the radar presentation have been selected and positively identified, a satisfactory fix can be obtained by striking arcs on the chart with the radar range of the selected objects. These arcs intercept at the ship's position. Best results will be obtained by using isolated objects such as detached lighthouses, rocky islets, and the extremities of long piers or jetties, but where no such objects are available a steep coastline with cliffs should be used.

Digitized by Google

Flat or gently shelving coastlines, such as mud flats or sand dunes, should not be used since it is difficult to identify any portion of them on the radar presentation. Identification is assisted in some areas by fitting objects, such as buoys and beacons, with radar reflectors, causing them to return strong echoes. Attention is drawn to the symbols with which such objects are marked on Admiralty Charts, and which are given in the latest edition of chart No. 5011, "Explanation of signs and abbreviations used on Admiralty Charts."

The difficulty of positive identification of objects is largely reduced if a Chart Comparison Unit is used in conjunction with the navigational radar. Fixes obtained with this equipment employ, in principle, an infinite number of ranges of the terrain in the vicinity of the ship, and in so doing a satisfactory fix will normally be assured.

In addition, radar beacons are available in some areas. Details of these and their use are given in the Admiralty List of Radio Signals, Volume II.

(15) Observations for errors of the compass.—No opportunity should be neglected for checking the error of the compass. When coasting, and a well-surveyed and fairly large-scale chart is available, an excellent method of observing the error is by taking the compass bearing of two suitable objects when in transit, and comparing this with the charted bearing; there should be sufficient distance between the objects to provide a sensitive transit. When this method is not available the error should be obtained by azimuths of a heavenly body. Errors should be observed on any change of course on which the ship is steadied for a reasonable time, and at least twice a day when steering a steady course for long periods.

(16) Change of variation of the compass.—The gradual change in the variation must not be forgotten in laying down positions by bearing on charts. The magnetic compasses placed on the charts for the purpose of facilitating plotting become in time slightly in error, and in some cases, such as with small scales or when the lines are long, the displacement of position from neglect of this change may be of importance. The compasses are re-engraved when the error amounts to a degree, but the chart plates cannot be corrected more frequently from the impossibility of making alterations often on one spot in a copper plate.

The geographical change in the variation is in some parts of the world sufficiently rapid to need consideration. For instance, in approaching Halifax from Newfoundland the variation changes 10° in less than 500 miles, and in the English channel about 5° in 400 miles. The Variation chart should be consulted on this head.

On certain general charts embracing large areas with considerable change of variation, true compasses are placed instead of magnetic compasses, the variation being shown by *isogonic lines* (curves of equal magnetic variation), in a similar manner to the Variation chart. One or two *isogonic lines* are also sometimes placed on charts, in addition to the magnetic compasses, in order to indicate the general direction of these curves, and thus facilitate the determination of the variation to be employed in portions of the chart not in immediate proximity to any one of the engraved compasses. Magnetic variation values shown on Admiralty charts are for the 1st July of the year mentioned.

(17) Local magnetic disturbance of the compass on board ship.—The term "local magnetic disturbance" has reference only to the effects on the compass of magnetic masses external to the ship in

Digitized by Google

which it is placed. Observation shows that such disturbance of the compass in a ship afloat is experienced only in a few places on the globe. Magnetic laws do not permit of the supposition that it is the visible land which causes such disturbance, because the effect of a magnetic force diminishes in such rapid proportion as the distance from it increases that it would require a local centre of magnetic force of an amount absolutely unknown to affect a compass half a mile distant.

Such deflections of the compass are due to magnetite ores in the bed of the sea under the ship, and when the water is shallow, and the force strong, the compass may be temporarily deflected when passing over such a spot, but the area of disturbance will be small, unless there are many centres near together. Such areas are depicted by a special symbol on charts, and the cause of the magnetic disturbance is referred to as a Local Magnetic Anomaly.

They may also be due to wrecks lying on the bottom in moderate depths, but investigations have proved that, while deflections of unpredictable amount may be expected when very close to such wrecks, it is unlikely that deflections in excess of 7° will be experienced, nor should the disturbance be felt beyond a distance of 250 yards.

It is very desirable that whenever a ship passes over an area of local magnetic disturbance, the position should be fixed, and the facts reported as far as they can be ascertained.

(18) Use of oil for modifying the effect of breaking waves.—Many experiences of late years have shown that the utility of oil for this purpose is undoubted, and the application simple.

The following may serve for the guidance of seamen, whose attention is called to the fact that a very small quantity of oil, skilfully applied, may prevent much damage both to ships (especially the smaller classes) and to boats, by modifying the action of breaking seas.

The principal facts as to the use of oil are as follows:—

1. On free waves, i.e., waves in deep water, the effect is greatest.

2. In a surf, or waves breaking on a bar, where a mass of liquid is in actual motion in shallow water, the effect of the oil is uncertain, as nothing can prevent the larger waves from breaking under such circumstances; but even here it is of some service.

3. The heaviest and thickest oils are most effectual. Refined kerosene is of little use; crude petroleum is serviceable when nothing else is obtainable; but all animal and vegetable oils, such as waste oil from the engines, have great effect.

4. A small quantity of oil suffices, if applied in such a manner as to spread to windward.

5. It is useful in a ship or boat, both when running, or lying to, or in wearing.

6. No experiences are related of its use when hoisting a boat up in a sea-way at sea, but it is highly probable that much time and injury to the boat would be saved by its application on such occasions.

At anchor, when the sea is sufficient to render it difficult to hoist up or in boats, oil bags from forward or from the swinging booms have been found to render the sea alongside comparatively smooth.

7. In cold water, the oil, being thickened by the lower temperature, and not being able to spread freely, will have its effect much reduced. This will vary with the description of oil used.

8. The best method of application in a ship at sea appears to be: hanging over the side, in such a manner as to be in the water, small canvas bags, capable of holding from one to two gallons of oil, such bags being pricked with a sail needle to facilitate leakage of the oil.

Digitized by Google

The position of these bags should vary with the circumstances. Running before the wind they should be hung on either bow and allowed to tow in the water.

With the wind on the quarter the effect seems to be less than in any other position, as the oil goes astern while the waves come up on the quarter.

Lying to, the weather bow and another position farther aft seem the best places from which to hang the bags, with a sufficient length of line to permit them to draw to windward, while the ship drifts.

9. Crossing a bar with a flood tide, oil poured overboard and allowed to float in ahead of the boat which would follow with a bag towing astern, would appear to be the best plan. As before remarked, under these circumstances the effect cannot be so much trusted.

On a bar with the ebb tide it would seem to be useless to try oil for the purpose of entering.

10. For boarding a wreck, it is recommended to pour oil overboard to windward of her before going alongside. The effect in this case must greatly depend upon the set of the current, and the depth of the water.

11. For a boat riding in bad weather from a sea anchor, it is recommended to fasten the bag to an endless line rove through a block on the sea anchor, by which means the oil is diffused well ahead of the boat, and the bag can be readily hauled on board for refilling if necessary.

12. Towing a vessel in a heavy sea, oil is of the greatest service, and may prevent parting the hawser. Distribute from the towing vessel forward and on both sides; if used only aft the tow alone gets the benefit.

(19) **Mirage and abnormal refraction.**—An unusual lapse rate of temperature (and therefore density as well) with height immediately above the sea (or land) surface produces a distortion in the appearance of objects near the horizon; such a phenomenon is known as mirage.

When the surface is relatively cold (and the wind very light) so that the density of the air decreases rapidly for a short distance above the surface, light rays from objects low down near the horizon are bent down, the same way in fact as are usually the rays of the sun when entering the earth's atmosphere at a low altitude. The effect is to render visible objects that are normally below the horizon, e.g., lights may be "raised" at night at much greater distances than one would ordinarily expect. This phenomenon is known as "looming."

A further occasional effect produced when the air is appreciably warmer than the sea is "superior mirage," in which an inverted image is seen over the real object; sometimes an erect image is seen immediately above and touching the inverted one. The object and its images in this instance are well defined in contrast to the shimmering object and image of the inferior mirage. Superior mirage is most often experienced in high latitudes and wherever the sea surface temperature is abnormally low.

"Inferior mirage," the effect of which is to decrease the distance at which objects are visible in a horizontal direction, is due to a rapid increase of density with height close to the surface such as occurs when air of comparatively low temperature blows over a warmer sea, or over a tarred road or desert when a hot sun is beating down on it. In either event light rays are bent up when approaching the surface where the density of the air is much less than above. The coastline, and at times a ship or island, may appear to be floating in air above

Digitized by Google

a shimmering horizon, possibly with, in the former instance, her hull either invisible or with an inverted image underneath. Inferior mirage is comparatively uncommon at sea and is more likely to be observed along a coastline than well out to sea.

When mirage is evident caution must be used in taking sights with a sextant, for abnormal refraction must necessarily be present also. With inferior mirage better, but not normal, results will usually be obtained by ascending as high as possible in the ship; with superior mirage the height of eye should be as low as possible. It is, however, advisable, whenever abnormal refraction is suspected, to measure the elevation of the celestial body above the back as well as the front horizon as explained in navigational text-books.

(20) **Aurora.**—The most common form of aurora is an arc system, single or multiple, narrow and well defined, or broad and diffuse, and centred on the magnetic meridian.

The most usual colour is pale whitish green when the auroral activity is weak and diffuse: but when the aurora arises high towards the zenith in the form of rays, rayed curtains and draperies with much rapid movement of the constituent rays, the colours sometimes become much stronger and more vivid, and include bright green, red and violet. When the curtains forming the aurora converge to form a corona, which may rotate very rapidly about the point of convergence, the displays may become very complex, filling practically the whole sky, and extending far to the equatorial side of the zenith with much rapid movement and change of colour from instant to instant.

Though the most usual duration of auroral displays in these high latitudes is several hours, they not infrequently last throughout the whole night from dusk to dawn. In such long displays the really intense and violently active periods with vivid strong colours are generally confined to spasms of 15–30 minutes, with the intervening periods filled with diffuse glows or quiet arc systems.

The absolute intensity of the light of the aurora is seldom great, and the brighter stars usually glimmer through it. In the most vivid and intense displays, the light may equal, but rarely surpasses, that of the full moon in a cloudless sky. It may give enough light to read by. On such occasions the aurora may be visible to some extent in partial twilight.

Though in high latitudes aurora occurs any time in the dark hours it is probably most frequent in the late evening hours from 9 p.m. till midnight or just after; it is more frequent in the equinoctial months than at other times and has a well-defined 11-year period of activity following the cycle of solar activity. A maximum of activity occurred in 1948, and the interval from maximum to minimum activity usually occupies a period of about 6 to 7 years. In high latitudes this cycle of activity is reflected more in the intensity and vividness of the displays than in their frequency of occurrence. Though really outstanding displays tend to occur around the years of maximum activity they may occur at any time of the cycle, except perhaps near the absolute minimum.

In addition to this 11-year cycle of activity active periods tend to recur at intervals of 27 days, *see* Magnetic Storms.

Northern hemisphere.—Aurora Borealis occurs most frequently along a zone which forms an approximate oval, of average radius 23°, with centre in the extreme north-west of Greenland. This zone of maximum frequency crosses Hudson Bay and the Labrador coast in about lat. 58° N. It runs south of Cape Farewell and along the south coast of

Digitized by Google

Iceland. It lies just north of North Cape, touches the extreme north of Novaya Zemlya, skirts Cape Chelyuskin and then eastward just north of Wrangel island into the north of Alaska. Along this zone aurora of some kind can probably be seen every suitable night when the sky is clear; 250 miles outside this maximum zone to the southward the auroral frequency decreases sharply to about 70–100 nights a year on the average, and to 20–25 nights 500 miles south of the maximum zone. Inside the maximum zone the geographical distribution of frequency is not so well established but it probably falls off more gradually than it does outside.

On the zone of maximum frequency itself aurora appears as frequently to the south of the zenith as to the north, but with increasing distance outside the zone the appearances concentrate more into the northern sky; the reverse is true inside the zone.

Southern hemisphere.—The frequency and distribution of Aurora Australis is not fully known. It is probable that it is more frequently seen at sea between about long. 50° E. and 175° W. than in other longitudes. Very fine displays have occasionally been seen in Australasia and on passages across the Southern Ocean. There is nevertheless a general impression that aurora is less frequent in the southern than in the northern hemisphere. This is probably to be accounted for by the fact that, apart from whaling and exploring expeditions, ships' tracks in general do not extend to such high latitudes as in the northern hemisphere.

The zone of maximum auroral frequency is roughly annular and is near the circumference of a circle of radius about 1,080 miles, centred in about lat. 75° S., long. 129° E. The frequency falls off both outside and inside this zone. A large part of the zone is within the continent of Antarctica.

(21) Magnetic storms.—Magnetic storms vary in intensity and frequency with the sunspot cycle, similarly to aurorae. An intense magnetic storm is always accompanied by a bright and active aurora. The deeply coloured aurorae, showing more pronounced red and green, and sometimes also blue and violet, tints, are invariably connected with magnetic storms of considerable or great intensity. Such a storm will produce simultaneous aurora in both hemispheres. In the greatest storms aurorae in some form may be visible down to about 20° north latitude in certain parts of the oceans, especially between the meridians of 30° W. and 140° W. Magnetic storms vary greatly in duration from a few minutes to several days; they are generally more intense during the hours of darkness. Long-continued storms usually show great fluctuations with periods of complete or partial quiescence. Similarly the associated aurora fluctuates between active and quiescent forms.

The origin of magnetic storms and aurorae is not yet fully understood, but they are intimately connected with the state of a local area of the sun. As the same part of the sun is again presented to the earth after an interval of about 27 days, a magnetic storm and aurora may recur at this time, usually in less intense form.

A ship's compass may tend to deviate during the progress of a considerable magnetic storm. In more intense storms the compass needle may oscillate 1° or more either side of its normal position. Such oscillation may persist for as long as 10 or 20 minutes before dying out. Further oscillation may occur after a period of quiescence. Deviations of 2° or more are rare, but during the great magnetic storm and aurora of January 25th, 1938, one of 4° to the eastward

Digitized by Google

was observed off the Portuguese coast. During a severe magnetic storm the compass may be deflected continually in one direction to the extent of about half a degree for some hours. When bright aurora is seen, especially if it is of the more deeply coloured and rapidly moving kind, and particularly when it is observed in low latitudes, the possibility of deflections of the compass should always be borne in mind.

During a considerable magnetic storm freak wireless reception may occur on certain waves and short-wave transmission may fade to complete silence. Beam radio communication, especially in a west-east or east-west direction, may be interrupted. Such conditions may last in some degree over a period of several days, at times when the sun is unusually active. Short-wave fading also occurs occasionally from a different form of solar disturbance known as a "bright eruption," when this is very intense. On the average such fading begins about 7 minutes after occurrence of the bright eruption and may last 5 or 10 minutes, gradually returning to normal within a period of 40 to 45 minutes. These fadings are confined to the daylight hemisphere of the earth, while the magnetic storm fadings may occur by day or by night.

GENERAL METEOROLOGY.

(All the following articles do not apply to every Pilot, but articles applicable to this Pilot will be referred to in the Climate and Weather Section in Chapter I.)

(1) Lows.—A low, or depression, appears on a synoptic chart as a series of isobars roughly circular or oval in shape, surrounding an area of low pressure. It is a main feature of the weather at sea in middle latitudes where it is responsible for most of the occasions of strong winds and unsettled weather, though not all depressions are accompanied by strong winds.

Lows vary very much in size and depth; one may be only a hundred miles in diameter and another over two thousand miles; some are deeper than others, a deep low being one in which the pressure is very much lower near the centre than on the outside whereas, on the other hand, a shallow depression is one where the pressure, although low near the centre, is not very much lower than in the surrounding districts.

Note.—The bracketed equivalents hereunder refer to the Southern Hemisphere.

In the northern (southern) hemisphere the winds blow round an area of low pressure in an anti-clockwise (clockwise) direction; there is also a slight inclination across the isobars towards the lower pressure. Thus the well-known rule for the northern (southern) hemisphere is that when an observer faces the wind the direction of the lowest pressure is from 8 to 12 points to his right (left). The strength of the wind is in all instances closely related to the steepness of the barometric gradient or distance apart of the isobars; the closer the isobars the stronger the wind.

Lows may move in almost any direction, though most often towards north-east (south-east) or east, at a speed of anything between 10 and 40 knots, though occasionally as much as 60, during the middle and most active stage of their existence; they slow down when filling up (*see* "occlusion" below). The life of a low is in the region of 4 to 6 days.

Digitized by Google

There are usually one or more fronts, probably radiating from the centre, in the area covered by a low; each front on a synoptic chart represents a belt of relatively bad weather, accompanied by a veer (backing) of wind, which marks the change from the weather characteristic of one air mass to that of another. During the first two or three days of its life a low has a warm and a cold front, the area between the two being known as a warm sector because the air has come from a warmer locality than that which is outside the sector (see Fig. 1*a*). Warm air is lighter than cold air and it rises over the cold air ahead of the warm front as shown in Fig. 1*b*; this causes condensation of the water vapour in the warm air, forming at first cloud and later drizzle or continuous steady rain. The cloud spreads out ahead of the warm front, and the highest cloud, cirrus or mares' tails, is often about 500 miles ahead. At the rear boundary of the warm sector, known as the "cold front," the cold air is pushing under the warm air forcing the latter to ascend rapidly; this process is sometimes violent enough to produce squalls. The rapid ascent of the warm air causes the moisture to condense in the form of cumulo-nimbus clouds (shower clouds), from which heavy showers may fall. The cold front gradually overtakes the warm front so that the warm sector is eventually lifted up from the earth's surface. When this has occurred the low is said to be occluded, and the warm and cold fronts have merged into the third type of front known as an "occlusion" (*see* Figs. 2*a* and *b*). When a low has become occluded, it usually decreases in intensity and rate of travel, and gradually fills up. On the other hand, a low which has a marked warm sector is likely to be deepening, the winds associated with it may increase in force and its rate of travel may increase. Lows are usually travelling in a direction approximately parallel to the isobars (and in the direction of the wind) in the warm sector.

The approach of a low is indicated by a falling barometer. In the northern (southern) hemisphere, if the low is approaching from westward and passing northward (southward) of the ship, clouds appear on the western horizon, the wind shifts to a south-westerly (north-westerly) or southerly (northerly) direction and freshens, the cloud layer gradually lowers, and finally drizzle, rain or snow begins. If the low is not occluded, after a period of continuous rain or snow there is a veer (backing) of wind at the warm front, a rise of temperature and diminution or cessation of rain (or snow) in the warm sector, the visibility being usually moderate and the sky overcast with low cloud. The passage of the cold front is marked by the approach from westward of a thick bank of cloud (which however cannot often be seen because of the customary low overcast sky in the warm sector), a further veer (backing) of wind to west or north-west (south-west), sometimes with a sudden squall, rising pressure, a fall of temperature, squally showers of rain, hail or snow, and improved visibility (except during showers). The squally showery weather with a further veer (backing) of wind and drop in temperature may recur while the low recedes owing to the passage of another cold front or occlusion. If the low is occluded, the occlusion is preceded by the cloud of the warm front; there may be a period of continuous rain mainly in front of and at the line of occlusion, or a shorter period of heavy rain mainly behind the occlusion, according as the air in front of the occlusion is colder or warmer than that behind it. There may be a sudden veer (backing) of wind at the occlusion.

Often another low follows 12 to 24 hours later, in which event the

Digitized by Google

barometer begins to fall again and the wind backs towards south-west (north-west), or even south (north).

If a low travelling eastward or north-eastward (south-eastward) is passing southward (northward) of the ship, the winds in front of it are easterly and they back (veer) through north-east (south-east) to north (south) or north-west (south-west); changes of direction are not likely to be so sudden as on the southern (northern) side of the low. In the rain area there is often a long period of continuous rain and unpleasant thick weather with low cloud. In winter in the colder regions the weather is cold and raw and precipitation is often in the form of snow.

Near the region of lowest pressure, lulls are sometimes experienced, but sudden changes are likely, and in a deep low the wind may increase in strength very rapidly, perhaps to gale force as the barometer begins to rise.

Sometimes in the air circulation of a large low, usually on the equatorial side and often on a cold front, a secondary depression develops, travelling in the same direction as the primary but usually more rapidly. The secondary often deepens while the original low decreases in intensity. In the region between the primary and the secondary depressions, the winds are not as a rule strong; but on the farther side of the secondary, usually the southern (northern) side, winds are likely to be strong and they may reach gale force. Thus the development of a secondary may cause gales at a greater distance from the primary than anticipated, while there may be only light winds where gales were expected.

The above is a brief general description of lows and the associated weather in temperate or middle latitudes of the northern (southern) hemisphere. It must be emphasised, however, that individual lows in different localities differ considerably from one another, according to the characteristics (especially the temperature and humidity) of the air currents of which they are composed, and the nature of the surface over which they are travelling.

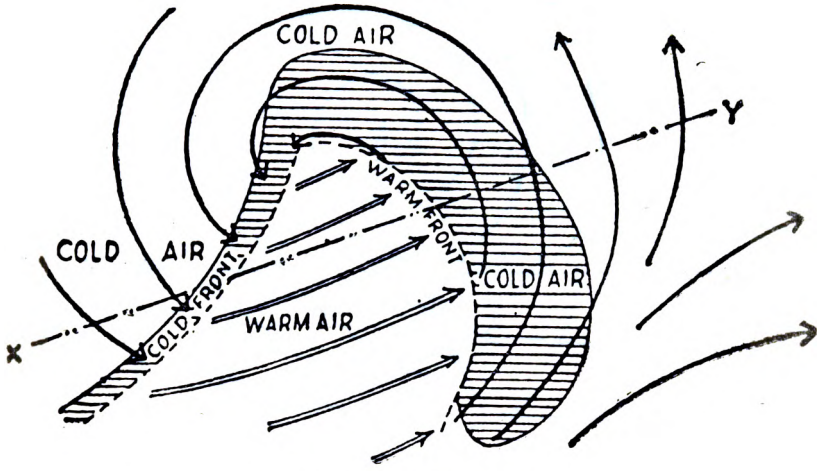
(2) **Tropical revolving storms.**—*Practical rules for avoiding them.*—These storms are so named because the wind blows round an area of low pressure situated at the centre. The direction of rotation is anti-clockwise in the northern hemisphere and clockwise in the southern hemisphere. The wind does not revolve round the centre of the low pressure in concentric circles but has a spiral movement inwards, towards the centre.

A tropical storm is not so extensive as the depression of higher latitudes but, within 75 miles or so of the centre, the wind is often far more violent, and the high and confused seas near the centre may cause considerable damage to large and well-found ships, while small vessels (for example, destroyers) have foundered. The danger is still greater when ships are caught in restricted waters without adequate room to manœuvre. Due to torrential rain and sheets of almost continuous spray, visibility near the storm centre (but outside the "eye") is almost nothing. Within 5 to 10 miles of the centre the wind is light or moderate and variable, the sky is clear or partially so, and there is a heavy, sometimes mountainous, confused swell; this area is known as the "eye" of the storm.

Every ship navigating in an area subject to tropical storms, during the period of their occurrence, should be constantly on the alert for any sign of their approach, so that steps can be taken to avoid the danger zone while there is still time and sea-room.

Digitized by Google

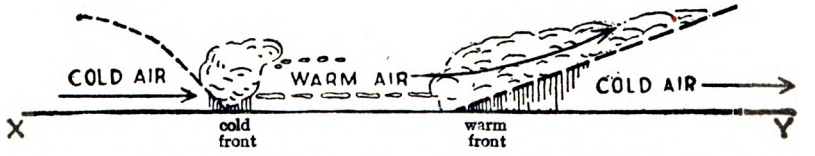
Fig. 1a.



Plan of a developed depression.

The double lines show the flow of the warm air, and the single lines the flow of the cold air.
The shading shows the areas where rain (or snow) is most probable.
Width of rain belt ahead of warm front is generally between 100 and 200 miles.

Fig. 1b.

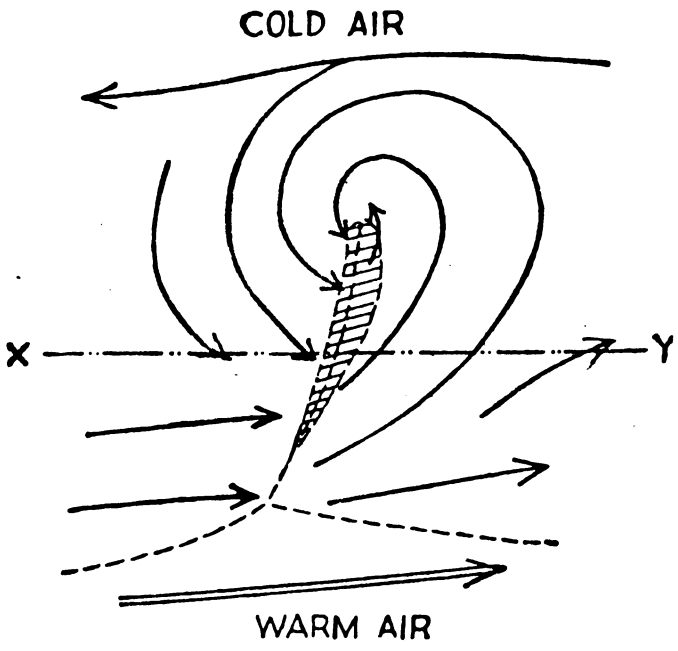


Vertical section of the depression along the line XY.

[*See over page.*

Digitized by Google

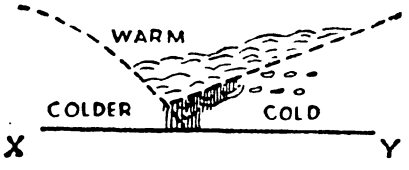
Fig. 2a.



Plan of an occluded depression.

The shading shows the region where rain (or snow) may be expected near the occlusion.

Fig. 2b.

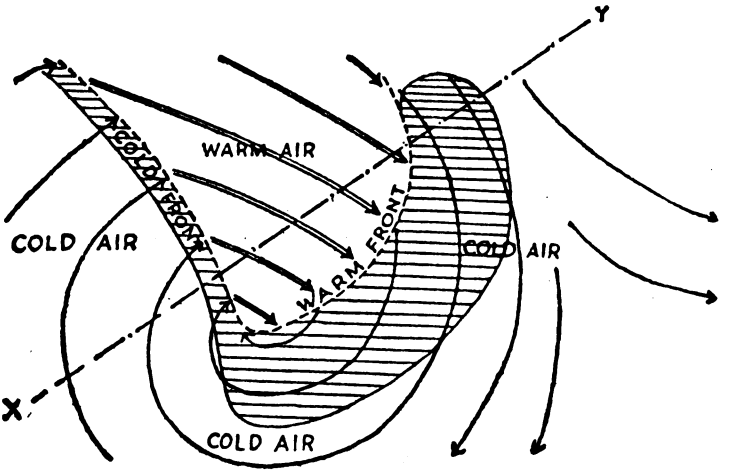


Vertical section of an occlusion of the cold front type.

The air in front of the occlusion is warmer than the air behind it.

Digitized by Google

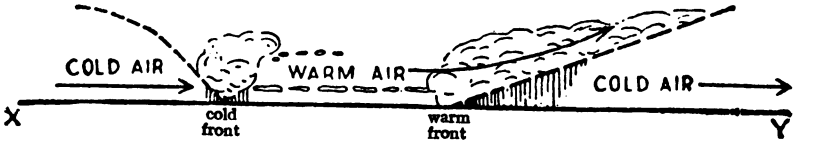
Fig. 1a.



Plan of a developed depression.

The double lines show the flow of the warm air, and the single lines the flow of the cold air.
The shading shows the area where rain (or snow) is most probable.
Width of rain belt ahead of warm front is generally between 100 and 200 miles.

Fig. 1b.

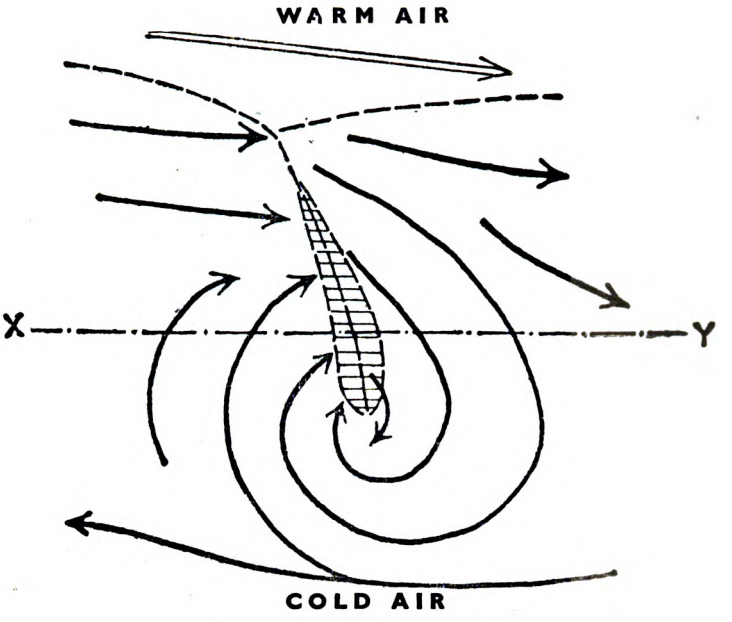


Vertical section of the depression along the line XY.

[*See over page.*

Digitized by Google

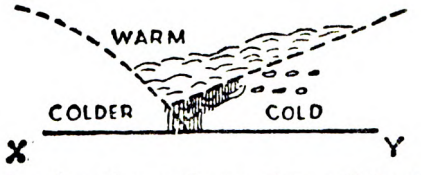
Fig. 2a.



Plan of an occluded depression.

The shading shows where rain (or snow) may be expected near the occlusion.

Fig. 2b.



Vertical section of an occlusion of the cold front type.

The air in front of the occlusion is warmer than the air behind it.

Digitized by Google

Localities, season, and average frequency.—Tropical storms occur for the most part on the western side of the oceans, though they are also experienced in the Bay of Bengal, off the north-west coast of Australia, and off the west coast of Central America. They are unknown in the South Atlantic. They are given various names according to the part of the World in which they occur.

Western North Atlantic Eastern North Pacific South Pacific	—hurricanes
Western North Pacific	—typhoons
Indian Ocean Bay of Bengal Arabian Sea	—cyclones
North-west Australia	—willy-willies

They are most frequent during the late summer and early autumn of their hemisphere; they are comparatively rare in the southern hemisphere from mid-May to November, and in the northern hemisphere from mid-November to mid-June. In the Arabian Sea, however, storms are most likely to occur at the change of the monsoon, i.e. October–November, and May–June, though they average only one or two a year. Out-of-season storms occur from time to time, particularly in the western North Pacific, where no month is entirely safe, and in the Indian Ocean, where one is reported south of the Equator perhaps once in two years outside the usual season. The following table shows approximately the average number of severe tropical storms recorded in 10 years in the several areas:

West Indies	50
Western North Pacific	250
„ South Pacific	30
Southern Indian Ocean	60
Bay of Bengal	20
Arabian Sea	10
Eastern North Pacific	30
West Coast of Australia	10

Variations in any one year amounting to 50% above or below the average are not unusual. Some of the figures quoted may be an underestimate since in the less-frequented parts of the world some storms may have escaped detection.

Origin, movement and extent.—Tropical storms originate as a general rule in the doldrums, between the parallels of 7° and 15° of latitude; those which affect the western part of the Pacific, South Indian and North Atlantic Oceans are first reported in the western third of those oceans, though there are exceptions such as in the North Atlantic during August and September where an occasional storm is known to begin near the Cape Verde islands. In the northern hemisphere they move off in a direction between 275° and 350°, though most often within 30° of due west. When in a latitude of 25° or so they usually recurve away from the equator and, by the time they have reached the 30th parallel, the track (or path as it is more usually called) is north-easterly. In the southern hemisphere they move off in a WSW. to SSW. direction (usually the former), recurve at about 15° to 20° S., and thereafter adopt a south-easterly path. Many storms, however, do not recurve but continue in a west-north-westerly (or west-south-westerly) direction until they reach the mainland, where they quickly die.

Digitized by Google

The speed of these storms is usually about 10 knots in their early stages, increasing a little with latitude; it seldom exceeds 15 knots before recurving, but thereafter 20 to 25 is usual, though speeds of 40 knots or even more have been known.

Occasionally storms move erratically, the path turning towards the equator, or adopting an easterly component in a low latitude, or even making a complete loop, but on these occasions its speed is low, usually less than 10 knots, while the unusual path is being followed.

The extent of the storm area varies considerably with individual storms, but generally speaking, winds of force 7 or more are improbable at more than 200 miles (especially on the equatorial side of the storm area), and force 8 unlikely to be exceeded at more than 100 miles, from the storm centre, at a latitude of less than 20°. Thereafter the radius increases with latitude so that these distances are nearly doubled on reaching the 35th parallel, but the intensity diminishes near the centre. Hurricane force winds are likely within 75 miles of the storm centre in the tropics, and gusts exceeding 150 knots have been reported in a few instances within 50 miles or so (except in the eye of the storm).

Warning of existence or approach.—In most instances, warning of the position, intensity and probable movement of a storm is given by radio at frequent intervals. (*See* Admiralty List of Radio Signals, Volume III.) Sometimes, however, there is insufficient evidence available for an accurate warning, or even a general warning, to be given, and ships must then be guided by their own observations. Of the following indications of the proximity of a tropical storm, the first is by far the most reliable within 20° or so of the equator; it should be borne in mind, however, that very little warning of the approach of an intense storm of unusually small diameter may be expected.

(*a*) If the corrected barometer reading is 3 mb. or more below the mean for the time of year, as shown in a climatic atlas or on the appropriate chartlets in the meteorological text of this Pilot, suspicion should be aroused and action taken to meet any development, such as raising steam in any available additional boilers, &c. It should be noted, however, that the barometer reading must be corrected not only for height, latitude, temperature and index error (if mercurial), but also for diurnal variation, the amount of which is given for each hour of the day in the Air Ministry climatic atlases and in the meteorological text of this Pilot. If the reading thus corrected is 5 mb. or more below normal, it is time to take avoiding action for there can be little doubt that a tropical storm is in the vicinity. According to an analysis of observations in the Western Pacific the centre of the storm is probably not more than 200 miles away. At this distance, at any rate in the China Sea vicinity, the wind has usually increased to about force 6.

When proceeding through an area liable to be visited by these storms it is desirable to take hourly readings of the barometer.

(*b*) An appreciable change in the direction and/or strength of the wind.

(*c*) A swell is sometimes evident, proceeding from a direction that approximates to the bearing of the centre. If ahead of the storm this indication may be apparent before the barometer begins to fall.

(*d*) Extensive cirrus cloud followed, as the storm becomes closer, by much alto-stratus cloud and subsequently fracto-cumulus or "scud."

Digitized by Google

(*e*) In addition there is the warning that can be given by Radar. Certain sets can display on the screen areas where moderate and heavy rain is falling. The greatest range to which this can be done at present is about 80 miles. Although moderate or heavy rain does not fall symmetrically all round a storm, it is continuous for at least 50 miles in a broad sector extending from the " eye " of the storm where there is a circular area of relatively light winds and clear or partially clear sky. By the time this final, and quite unmistakable, evidence of the exact position of the storm is available, the ship is already in fairly high seas, and is probably experiencing winds of force 9 or 10. It should be in time, however, to enable her to avoid the centre, on the edge of which conditions are worst of all.

Note.—In accordance with Article 35 of the International Convention for Safety of Life at sea it is the duty of every ship who suspects the presence or formation of a tropical revolving storm immediately to inform other vessels and shore authorities with all the means at her disposal. Weather reports should be made by radio at frequent intervals giving as much information as possible, especially corrected (*not* for diurnal variation as in (*a*) above) barometer readings. If barometer readings are uncorrected this fact should be stated in the signal.

Information required by the seaman before deciding upon action to be taken.—To decide on the best course of action if a storm is suspected to be in the vicinity, a seaman requires to know :—

(*a*) the bearing of the centre of the storm ;
(*b*) the path of the storm ;
(*c*) the semicircle in which the ship is situated.

If an observer faces the wind, the centre of the storm will be from 9 to 11 points on his right-hand side in the northern hemisphere when the storm is about 200 miles away, i.e., when the barometer has fallen about 5 millibars and the wind has increased to force 6 or thereabouts ; as a rule the nearer one is to the centre the more nearly does the angular displacement approach 8 points.

The path of the storm may be approximately determined by taking two such bearings with an interval of from two to three hours between observations, provided that allowance is made for the ship's movement. It can, however, be assumed that the storm is not travelling towards the equator ; and, if in a lower latitude than 20°, its path is most unlikely to have an easterly component ; and, on the rare occasions when neither of these statements applies, the storm is moving very slowly. (Exceptions to this are most likely in the South Pacific, where the occasional storms often move off on a course almost due south which develops an easterly component at a latitude of about 15°, and in the western North Pacific in the instance of some of the out-of-season storms which may recurve at an early stage.)

The diagram headed " Typical Paths of Tropical Storms " (at the end of this article) illustrates the terms " dangerous semicircle " and " navigable semicircle." The former lies on the side of the path towards the usual direction of recurvature, i.e., the right-hand semicircle in the northern and the left-hand semicircle in the southern hemisphere. It is so called because a sailing or low-powered ship caught in it may be blown towards the path along which the storm will pass, or the storm may recurve and the centre pass over her. The navigable semicircle is that which lies on the other side of the path. A ship situated within this semicircle will tend to be blown away from

Digitized by Google

the storm centre, and the recurvature of the storm will increase her distance from the centre.

Practical rules for avoiding tropical storms.—In whatever situation a ship may find herself, the matter of vital importance is to avoid passing within 50 miles or so of the centre of the storm ; it is preferable to keep outside a radius of 200 miles or more, because at this distance the wind does not often exceed force 7 (and is generally not more than force 6), and freedom to manœuvre is maintained. If a ship has at least 20 knots at her disposal, and shapes a course that will take her most rapidly away from the storm before the wind has increased above the point at which her movement becomes restricted, it is seldom that she will come to any harm.

Sometimes a tropical storm moves so slowly that a vessel, if ahead of it, can easily outpace it or, if astern of it, can overtake it. Since, however, she is unlikely to feel seriously the effects of a storm so long as the barometer does not fall more than 5 mb. (corrected for diurnal variation) below the normal, it is recommended that frequent readings should be made if the presence of a storm in the vicinity is suspected or known, and that the vessel should continue on her course until the barometer has fallen 5 mb., or the wind has increased to force 6 when the barometer has fallen at least 3 mb. If and when either of these events occurs, she should act as recommended in the following paragraphs, until the barometer has risen above the limit just given, and the wind has decreased below force 6. Should it be certain, however, that the vessel is behind the storm, or in the navigable semicircle, it will evidently be sufficient to alter course away from the centre.

In the northern hemisphere.—(*a*) If the wind is veering, the ship must be in the dangerous semicircle. A steam or other power-driven vessel should proceed with all available speed with the wind 1 to 4 points (depending upon her speed) on the starboard bow. A sailing vessel should heave to on the starboard tack. Either type of ship should haul round to starboard as the wind veers, thereby tracing a course relative to the storm as shown by the pecked line in the diagram.

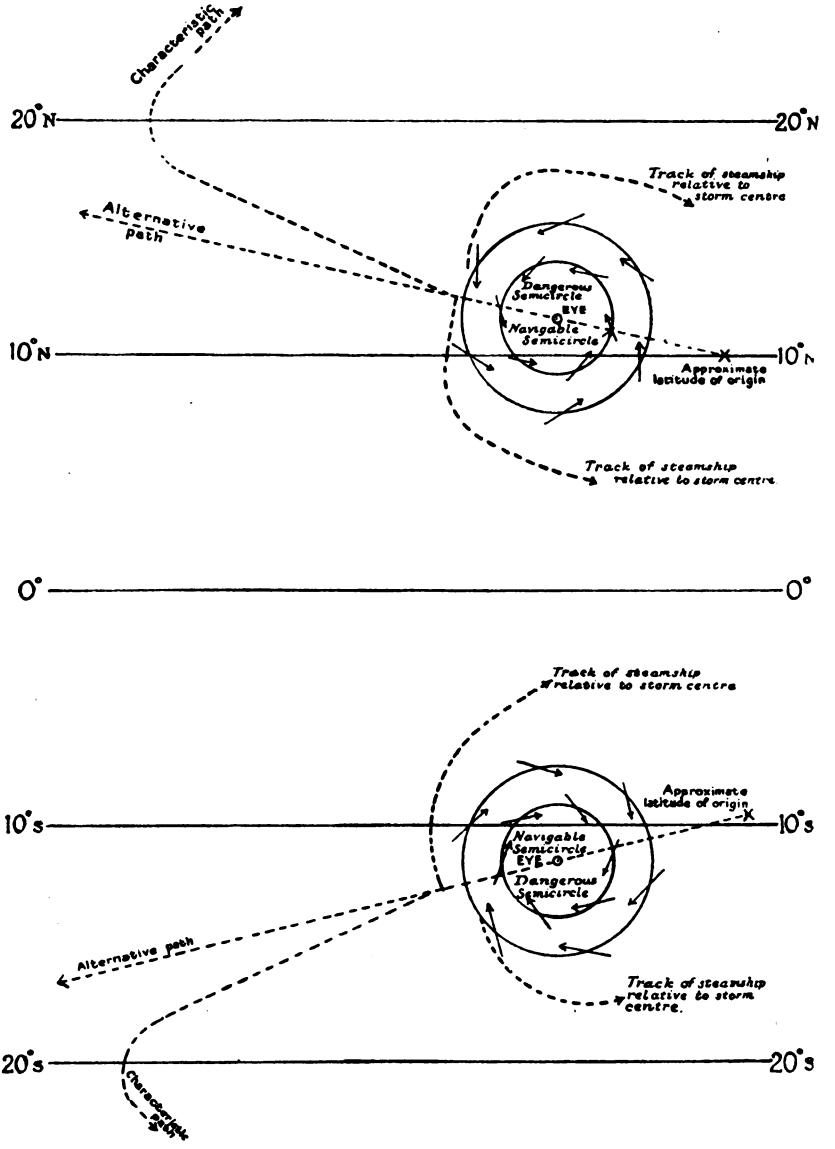
(*b*) If the wind remains steady in direction, or if it backs, so that the ship seems to be nearly in the path (it is sometimes difficult to determine satisfactorily if indeed the ship is nearly in the path, particularly if in the dangerous semicircle, because the wind does not always behave according to rule) or in the navigable semicircle respectively, a steam vessel should bring the wind well on the starboard quarter and proceed with all available speed. A sailing vessel should run with the wind on the starboard quarter. Either type of ship should alter course to port as the wind backs, thus tracing a course relative to the storm as shown by the pecked line in the diagram.

In the southern hemisphere.—(*a*) If the wind is backing, the ship must be in the dangerous semicircle.—A steam or other power-driven vessel should proceed with all available speed with the wind 1 to 4 points (depending upon her speed and that usual for a storm in this latitude) on the port bow. A sailing vessel should heave to on the port tack. Either type of ship should haul round to port as the wind backs, thereby tracing a course relative to the storm as shown by the pecked line in the diagram.

(*b*) If the wind remains steady in direction, or if it veers, so that the ship seems to be nearly in the path (it is sometimes difficult to determine satisfactorily if indeed the ship is nearly in the path,

Digitized by Google

TYPICAL PATHS OF TROPICAL STORMS



Note.—In this diagram the isobars are shown as concentric circles about the eye; in practice this is usually the case within 150 miles or so of the centre. Outside this distance the isobaric form often loses its symmetry and strong winds often extend farther on the polar side than on the equatorial.

Digitized by Google

particularly if in the dangerous semicircle, because the wind does not always behave according to rule) or in the navigable semicircle respectively, a steam vessel should bring the wind well on the port quarter and proceed with all available speed. A sailing vessel should run with the wind broad on the port quarter. Either type of ship should alter course to starboard as the wind veers, thus tracing a course relative to the storm as shown by the pecked line in the diagram.

If there is insufficient room to run, when in the navigable semicircle, and it is not practicable to seek shelter, a vessel should heave to with the wind on the starboard bow in the northern hemisphere, and on the port bow in the southern hemisphere.

If in harbour, or at anchor, a seaman should be just as careful as at sea in watching the shifting of the wind and estimating the movement of the storm relative to himself, as by so doing he will be able to shift his berth with advantage or otherwise act according to circumstances. It is far preferable, however, to put to sea, if this can be done in sufficient time to avoid the worst of the storm. Riding out a tropical storm, the centre of which passes within 50 miles or so, in a harbour or anchorage, even if some shelter is offered, is an extremely unpleasant and hazardous experience, especially if there are other ships in company. Only if berthed alongside, or if special moorings and long bridles are used, can a ship feel secure.

Discretion must, of course, be used. In the case of a low-powered or small vessel with, for example, insufficient warning to enable her to gain sufficient distance from the storm by putting to sea, it will be preferable to remain in a reasonably sheltered harbour. If at sea and warning of an approaching storm is given and there is considered to be insufficient time or sea room to avoid the dangerous part of the storm area, it may be advisable for vessels of this type to seek shelter. In the China Sea, for example, there are so-called typhoon harbours which are listed in the Admiralty Pilot. In all cases, however, the seaman must use seamanship and initiative.

(3) Local modification of the weather near the coast.—The information given in Chapter I on climate and weather in the area covered by the Pilot refers necessarily to the coastal and sea regions generally but cannot attempt to deal with the local effects on the wind and weather of each separate headland, bay, or creek. The following notes, however, should prove helpful in showing how the weather in the general vicinity is likely to be modified by the topography or shape of the land close to the actual place in which the mariner is concerned.

(i) If the coastline is steep-to, onshore winds that approach it at an angle are usually deflected nearly along the shore and increased somewhat in speed. And when the wind approaches a strait whose direction is somewhat similar to that of the wind, the wind tends to blow along the strait and increases in speed as the strait narrows.

When a strong wind blows directly towards a very steep coast, there is usually a narrow belt of contrary gusty winds close to the coast.

(ii) Similarly when the wind blows onshore towards the entrance to a wide estuary, especially one with hills on both sides, it generally tends to blow up the estuary. This effect is most marked in the afternoon but there is often no such tendency during the night and early morning.

Digitized by Google

(iii) An offshore wind is often squally on the lee side of hilly coasts, especially when the air is much colder than the sea, as for example when it blows off snow-covered land and when the wind over the open sea is force 5 or more.

(iv) Near headlands or islands with steep cliffs there may be large changes in direction (up to about 90°) and speed of the wind in addition to those mentioned above.

(v) During quiet and warm weather with clear or fairly clear skies, a sea breeze is of common occurrence during the warmer part of the day; it is especially frequent in the tropics and sub-tropics. It blows onshore from, on the average, 4 to 8 hours after sunrise until shortly before sunset, reaching its maximum development during the afternoon (1300 to 1600); if there is an appreciable regional or general wind, then this will be modified by the onshore sea breeze. Under particularly favourable circumstances such as high day temperatures, relatively cool sea, and hilly background to coast, the sea breeze may blow as much as force 4 (occasionally 5) and extend 20 miles or more to seaward from the shore. At night under similar circumstances a lighter breeze blows from the land to the sea; it seldom extends more than 5 miles from the shore nor does it become appreciable much before 2200 local time; under favourable conditions, as in the tropics, it usually lasts until an hour or so after sunrise.

(vi) When sea fog that is caused by the passage of warm air over a colder sea surface is general over the open sea, visibility is better close to leeward of a hilly island or promontory than to windward. This effect is most marked in late spring and summer, during the early afternoon when the land is at its warmest, and this applies to low-lying land as well.

(vii) Radiation fog which forms over land on quiet nights with clear skies, mainly in autumn and winter, and sometimes spreads a few miles out to sea, is least thick during the afternoon and is often worst during the first hour or two after sunrise.

(4) **Forecasting sea fog.**—The most frequent type of fog in the open sea is that caused by relatively warm air flowing over a colder sea. Warning of this type of fog may be obtained by frequent observations of air and sea surface temperatures; if the sea temperature falls below the dewpoint of the air, fog is almost a certainty. The following procedure is recommended whenever the temperature of the air is higher than, or about equal to, that of the sea, especially at night when approaching fog cannot be seen until shortly before entering it.

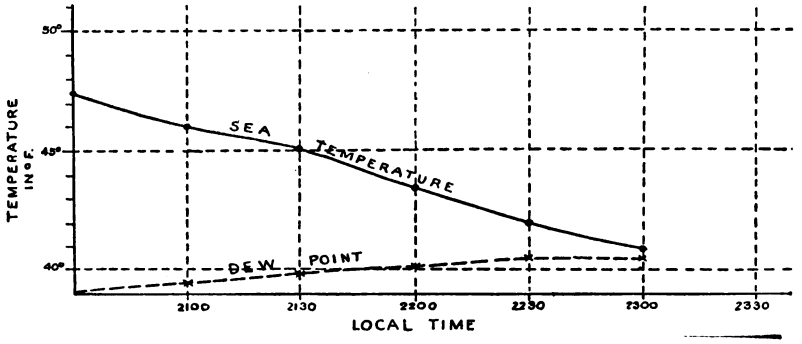
Sea and air (both dry and wet bulb) temperatures should be observed at intervals of about 5 miles and the sea temperature plotted against dewpoint. The dewpoint is obtainable from tables published in various text-books, but at temperatures up to about 60° F. a close enough approximation may be obtained by assuming it to be the same amount below the wet-bulb temperature as the latter is below the dry-bulb temperature; for example, if the dry bulb reads 50° F. and the wet bulb 48°, the dewpoint is about 46°. If the curves of sea temperature and dewpoint converge, fog may be expected by the time at which they coincide.

The figure below represents conditions that might be found by a low-powered ship in about long. 40° W. proceeding westward on the

Digitized by Google

appropriate lane route for Halifax, Nova Scotia. At 2200 it would become evident that there is a probability of running into fog in about an hour's time, assuming that the sea temperature continues to fall at about the same rate that it has done during the last 1½ hours.

From the appropriate chart of average sea surface temperatures it can be seen where a rapid fall of temperature may be expected, so that if the dewpoint is within 5° or so of the sea temperature when approaching the colder water zone, this will also give a fairly reliable warning of fog.

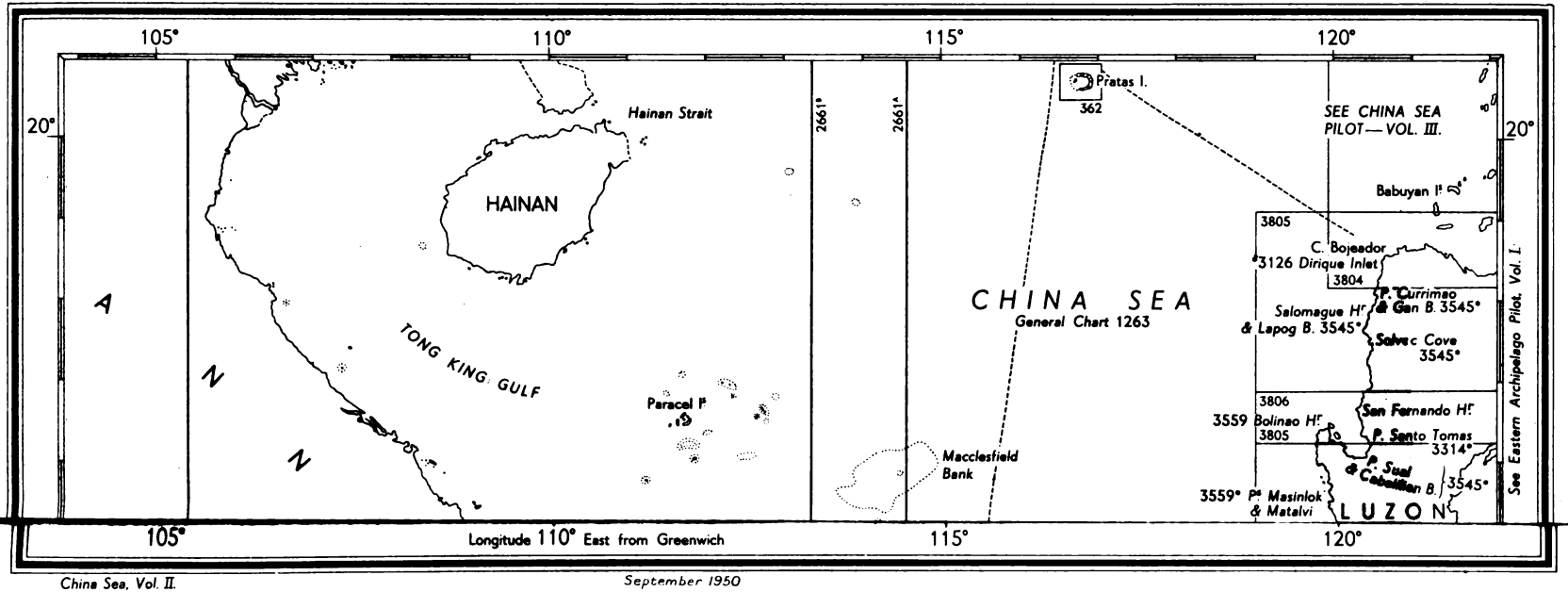


If it is desirable and practicable to escape from fog, a ship should steer for warmer water which will again be evident from the charted isotherms.

Fog, or very poor visibility, at sea may also occur in snow or heavy rain, or in association with the passage of a warm front or occlusion, or, when within 20 miles or so of land, it may occur as a result of radiation fog extending from the land; in high latitudes in winter, sea smoke may be met near land, when very cold offshore winds are blowing, or near extensive ice. The method described above will not give warning of these fogs, of which frontal fogs, though common in middle latitudes, are neither so extensive nor so persistent in any one locality, and the other fogs mentioned are rarely encountered far from land (or extensive ice).

Digitized by Google

Digitized by Google



China Sea, Vol. II.

September 1950

S.D.31

Digitized by Google

IMPORTANT.

Details of Lights, Fog Signals, and Time Signals (visual) are not included in this volume; for this information the Admiralty List of Lights, Vol. 6, should be consulted.

Information regarding Vertical Movement of the Water is not included; for this the Admiralty Tide Tables should be consulted.

Details of Radio information (weather bulletins, storm and navigational warnings, time signals, fog signals, and D.F. stations) are not included; for this information the Admiralty List of Radio Signals should be consulted.

Digitized by Google

Digitized by Google

CHINA SEA PILOT

VOL. II

CHAPTER I

BORNEO — PHILIPPINE ISLANDS — CURRENTS — SIGNALS — SUBMARINE CABLES — NETHERLANDS SUBMARINES — RADIO STATIONS — AIR LIGHTS — STANDARD TIME — COAL AND FUEL OIL — REPAIRS — CONSUL — PASSAGES — CLIMATE AND WEATHER — CLIMATIC TABLES

Chart 1263.

BORNEO.—Borneo is the largest island in the East Indian archipelago. Chains of mountains traverse its length; the main range, from 5,000 to 6,000 feet (1,524^{m}0 to 1,828^{m}8) high, terminates in Kina Balu, a mountain 13,455 feet (4,101^{m}1) high, situated about 60 miles from the northern extremity of the island. There are several other ranges of mountains.

Its vast interior consists of almost impenetrable virgin forest or jungle, teeming with animal life, but sparsely populated by man. The soil is fertile, and in some parts near the coast is marshy.

The greater part of the island is under the sovereignty of the Netherlands, along the coast of which they maintain establishments. The territories of Saráwak, Brunei, and of the State of North Borneo extend over and along the north-west, north, and north-eastern coasts.

The total population of Netherlands Borneo is estimated at about 1,000,000. The productions are many and varied, and its mineral resources are believed to be great. The Chinese, who have been settled in most of the towns for generations, conduct all the trading operations. The natives are of the Malayan type.

Saráwak.—The territory of Saráwak, on the north-west coast of Borneo, comprises an area of about 50,000 square miles, with a population of 546,381 in 1947, composed of various races. It is intersected by many rivers navigable for a considerable distance inland. The sovereignty of the district from Tanjong Datu, at its western end, to the entrance of Sungei Sadong, was obtained from the Sultan of Brunei, in 1842, by Sir James Brooke, well known as Rajah Brooke of Saráwak. The extent of the territory was increased by various concessions between 1861 and 1905, and in 1888 Saráwak was recognized as an independent state under British protection.

On July 1st, 1946, Saráwak was ceded to Great Britain by the Rajah, and became a Crown Colony.

Digitized by Google

Chart 1263.

Government.—The constitution provides for a Governor, Supreme council, which consists of 7 Europeans, 1 Chinese and 4 Malay members and a Legislative council, known as the Council Negri.

Rivers.—Sungei Rajang, navigable for about 160 miles, and Batang Baram, navigable for 100 miles, Batang Lupar and Batang Limbang, are the principal rivers. These rivers have bars at their mouths which prevent the entrance of large vessels.

Products.—Trade.—The principal products are rubber, oil, sago, rice, birds' nests, gold, pepper, rattans and jungle produce.

An important industry is the oil industry at Miri, and it is probable that there are other oil bearing areas as yet untouched.

The principal exports are fuel oil, lubricating oil, kerosene, rubber, sago flour, motor spirit, copra, gold and cutch. The chief imports are eggs, tobacco, wines, spirits, iron and steel manufactures, rice, sugar, tea, cloth and cotton goods.

Shipping.—In 1947, vessels of 1,047,317 tons entered the ports of Saráwak from foreign ports.

Ports.—The principal ports are Kuching, Sibu, and Miri.

Communications.—Internal communication is generally by means of the rivers.

For steamer communication, *see* body of this work.

Currency.—The coins are :—Silver—20 and 50 cents ; nickel—5 and 10 cents ; and copper—half and one cent. Notes of the value of 1, 5, 10, 25, 50 and 100 dollars are in circulation.

Weights and measures.—The weights and measures are the same as are in use in the State of North Borneo, *see* page 4.

Brunei.—In 1888 the State of Brunei was placed under British protection, and in January, 1906, by treaty, the Sultan handed over the general administration of his State to a British Resident. The present Ruler is H.H. Sultan Ahmed Tajudin Akhazul Khairi Wadin, C.M.G. who succeeded his father in September, 1924.

The supreme authority in the state is vested in the Sultan in Council, which consists of 9 members, including the British Resident, with the Sultan as President.

Brunei has an area of 2,226 square miles, with a population in 1947, of about 49,500.

Products.—Trade.—The principal products are crude oil, rubber, jelutong and sago.

The principal exports are crude oil, cutch, sago flour, hides and rattans. The chief imports are cotton cloths, tinned provisions, iron, rice, tobacco, salt and sugar.

Communications.—There is a regular steamer service between Brunei, Labuan, Kuala Belait, and Limbang ; there is also launch communication between Brunei and the up-river districts.

There is a public telephone service in Brunei.

Currency.—The currency is that of the Straits Settlements, the dollar = 2*s.* 4*d.* Subsidiary silver coins are 50, 20, 10 and 5 cent pieces. Nickel 5 cent pieces, and copper one cent, and half-cent.

Labuan.—Labuan, an island situated about 6 miles off the north-west coast of Borneo, was ceded to Great Britain by the Sultan of Brunei, in 1846, and taken possession of in 1848. Labuan was incorporated, in 1907, in the colony of the Straits Settlements, and was constituted a separate Settlement on 1st December 1912. In 1946, it was re-united with British North Borneo.

Labuan possesses a good harbour, and is a transhipping centre for

Digitized by Google

Chart 1263.

much of the produce of the neighbouring coasts of Borneo and the Sulu archipelago. The estimated population of the island, in 1947, was 9,253.

Currency.—The currency is that of the Straits Settlements, the dollar = 2*s.* 4*d.* Subsidiary coins are :—Silver—5, 10 and 20 cents ; nickel—5 cents ; copper—one cent.

Straits notes are available. British North Borneo and Saráwak money is generally accepted.

Weights and measures.—The commercial weights are :—

1 kati	= 16 tahil	=	1⅓ lbs. avoirdupois.
1 picul	= 100 kati	=	133⅓ ,, ,,
1 koyan	= 40 picul	=	5,333⅓ ,, ,,

The measures of capacity are the gantang, or gallon, and chupak, or quart.

The measure of length is the English yard, with its divisions and multiples, and land is measured by the English acre.

Health.—Remittent and intermittent fevers occasionally prevail, but are of a mild type.

State of North Borneo.—This State, formerly known as Sabah, situated at the north-eastern end of Borneo, has a coastline of about 800 miles. The chief geographical feature in the territory is Mount Kina Balu. The territory of North Borneo was acquired from the Sultans of Brunei and Sulu by cession for a small annual payment in 1879–80, and the British North Borneo Company was incorporated by Royal Charter in 1881. In May, 1888, the British Government formally extended protection to the State of North Borneo.

The area of the State is 29,382 square miles and includes the whole northern portion of the island of Borneo to Sibetik island on the east coast, in lat. 4° 10′ N.

The estimated population in 1949, was 336,000, consisting mainly of aboriginal tribes and Muhammadan and Chinese settlers.

The climate, for a tropical country, is equable and healthy.

Government.—The territory is administered by a Governor aided by a nominated Advisory Council of 20 members, of whom 7 are European officials, 3 European unofficials, 6 local natives and 4 Chinese. There is also an Executive committee consisting of 6 officials and 4 unofficials.

Harbours.—The principal harbours are those of Jesselton on the west coast, Kudat on the north coast, Sandakan, Lahad Datu, and Tawau on the east coast, the two latter of which are described in the Eastern Archipelago Pilot, Vol. I.

The rivers are small.

Products.—Trade.—The principal products are rubber, timber, copra, dried and salt fish, cutch, tobacco, Manila hemp, sago, rice, damar and rattans.

The principal exports are firewood, rubber, copra, livestock, hemp, timber, sago flour, dried and salt fish. The chief imports are motor spirit, tea, oil, rice, spirits and wines.

Coal is reported to exist near Weston, around Marudu bay and in the vicinity of Sandakan and Cowie bay (*see* Eastern Archipelago Pilot, Vol. I).

Communications.—There is regular steamer communication between Sandakan, Kudat, Jesselton, Labuan and Singapore, and with Hong Kong and Jolo.

A railway, 125 miles long, connects Jesselton to Melalap in the interior, with a branch from Beaufort to Weston in Brunei bay.

Digitized by Google

Chart 1263.

The State is connected to the general telegraph system of the world, and there is general telephonic communication throughout the State.

Currency.—The coins are :—Silver—25 cents ; nickel—1, 2½ and 5 cents ; copper—½ cent and one cent. Notes of the value of 25 and 50 cents, one dollar = 2*s.* 4*d.*, 5, 10 and 25 dollars are in circulation.

Weights and measures.—The weights and measures used are the same as for Labuan, *see* page 3.

PHILIPPINE ISLANDS.—The Philippine islands, situated in the northern part of the East Indian archipelago, were discovered by the Portuguese navigator Fernando de Magalhaens, in 1521, and were formally annexed to Spain in 1565. They were ceded to the United States of America in 1898. On the 14th November 1935, the President of the United States signed a proclamation establishing the new Philippine Commonwealth, and certifying the election of its first President.

The Philippines, together with the Sulu archipelago, comprise 7,107 islands, of a total area of 115,600 square miles, and lie approximately between lat. 5° N. and 20° N. and long. 116° E. and 127° E. Luzon, in the north, and Mindanao, in the south, are the two largest islands of the group ; of the remainder the most important are Samar, Negros, Panay, Palawan, Mindoro, Leyte, Cebu, Bohol, and Masbate.

Physical features.—The Philippine islands are generally mountainous and densely wooded, and contain several volcanoes. Mount Apo, 9,690 feet (2,953^{m}5) high, in Mindanao, and Mount Pulog, 9,480 feet (2,889^{m}5) high, in Luzon, are probably the highest points.

The principal rivers in the Philippines are the Cagayan, Agno, Pampanga, Pasig, and Bicol in Luzon, and the Mindanao and Agusan in Mindanao.

Flora.—The flora is essentially Malaysian, but Himalayan elements occur in the mountains of northern Luzon, while a few Australian types are found at various altitudes. The vegetation of the coastal regions, including the mangrove swamps, is practically identical with that of similar areas throughout the Malay archipelago. Considerably more than half the land area of the islands is covered with forests. There are many valuable hardwoods as well as many of the softer variety. Some timber trees attain a large size. There are many useful kinds of palms ; useful bamboos and rattans abound. The forests yield gums, including rubber, various fruits, nuts, spices and drugs.

Fauna.—Mammals are scarce, with the exception of shrews, rats, mice and bats. Red or brown deer are found in Basilan, Mindanao, Leyte, Samar, and the Calamian islands. The timarau, a small buffalo, is peculiar to Mindanao. Carnivores are represented by the mongoose, the binturong, otter, and civet cats. The flying lemur and tarsiers range from Basilan to southern Luzon. Only one genus of monkey has been found, but it is represented by five species.

There are about 760 species of birds. Reptiles also abound. The marine fauna is one of the most abundant known, more than 1,000 species having been found, three-quarters of which at least are edible. The Philippines have the richest molluscan fauna of any equal area in the world, and many of the shells are of great beauty. Pearl oysters abound, and the pearls of the Sulu archipelago have an international reputation.

Earthquakes.—Earthquakes of the most severe description have been experienced ; the earliest recorded took place in 1610 ; that of

Digitized by Google

Chart 1263.

1796 was sadly calamitous. In 1824 many churches in Manila were destroyed, together with the principal bridge and numbers of houses, and a chasm opened 4 miles in length. The most disastrous of recent times was that of 1863, when 400 persons were killed and 2,000 wounded in Manila, and 46 public buildings and 1,100 private houses were seriously injured or destroyed. Others occurred in 1645, 1658, 1675, 1699, 1828, 1832, 1852, 1869, and 1880, when there were terrible shocks of earthquake, and in 1891, in the province of Panga Sinan, earthquakes were continually repeated during a period lasting a month. In 1897 was the destructive eruption of Mayon. In 1911 there was an explosion of gas in the crater of Taal volcano, devastating the country surrounding Lake Taal. Active volcanoes exist in the Babuyan islands, Luzon, Negros, and Mindanao.

Government.—The Republic of the Philippines came into existence on July 4th, 1946, by agreement with the United States Government embodied in an act of Congress signed by the President of the United States of America on March 24th, 1934, and accepted by the Philippine Legislature on May 1st, 1934. After a 10-year transitional period complete independence was automatically effective.

The Republic is governed by a constitution adopted on May 14th, 1935, and amended in 1940. The President is assisted by 11 departmental secretaries. The Legislature consists of a Senate of 24 members and a House of Representatives of 98 members, all elected on April 23rd, 1946, at which time 8 of the senators were also elected.

Population.—In 1948, the total population by the census was 19,234,182.

Products.—Trade.—The principal products are rice, Manila hemp, copra, sugar cane, maize, tobacco and maguey. The principal fruit is the banana; there are also mangoes, papaya, oranges, etc. The principal exports are sugar, hemp, copra, coconut oil, gold, tobacco products, and embroideries. The chief imports are cotton goods, iron and steel manufactures, motor cars, flour, chemicals, and silk goods.

Currency.—The Philippine peso is equivalent to fifty cents of the United States dollar. The coins in use are the peso, half peso, peseta (20 centavos), media peseta (10 centavos), all in silver; 5 centavos, in nickel; one centavo, in bronze. Bank notes are in 1, 2, 5, 10, 20, 50, 100, and 500 pesos.

Weights and measures.—Both the metric system and United States weights and measures are in general use for foreign trade and commerce. Occasionally other measures are used, principally the "kati," variable but normally equivalent to $1\frac{1}{3}$ lbs., and the "ganta," equal to 3 litres.

Port of entry.—The only port of entry included in this volume is Manila.

Communications.—There is regular communication by steamer between Manila and all parts of the world, and between all the principal ports of the Philippines.

The only railway affecting this volume is in the island of Luzon, with a total mileage of 490 miles.

There is a regular air service between Manila and Baguio.

The important towns and villages in the Philippines are connected by telegraph and telephone; and with the universal telegraph system.

Uniform system of buoyage.—All buoys laid down in the Philip-

Digitized by Google

Chart 1263.

pine islands are painted in accordance with the system in the United States, as follows:—

In approaching a channel from seaward, red buoys with even numbers will be found on the starboard side, and black buoys with odd numbers on the port side.

Middle ground buoys will be painted with red and black horizontal bands, and may be passed on either hand; those conical in shape are recommended to be left on the starboard hand and those can-shaped on the port hand.

Mid-channel buoys will be painted with black and white vertical stripes, and must be passed close-to in order to avoid danger.

Isolated danger buoys will be painted in red and black horizontal bands and may be can-shaped or some other shape.

Perches, with balls, cages, etc., will, when placed on buoys, be at turning points, the colour and number indicating on which side they should be passed.

Different channels in the same bay, sound, river, or harbour will be marked as far as practicable by different descriptions of buoys. Principal channels will be marked by conical buoys; secondary channels with can buoys; and minor channels with spar buoys. When there is but one channel, conical buoys properly coloured and numbered are usually placed on the starboard side and can buoys on the port side of it.

Day beacons, stakes, and spindles (except such as are on the sides of channels, which will be coloured like buoys) are constructed and distinguished with special reference to each locality, and particularly with regard to the background upon which they are projected.

When lights are exhibited, those on the starboard side of the channel on entering are *red*, those on the port side are *white* or *green*.

In some localities the channels may be marked by "Lazy Vee" beacons which consist of beacons surmounted by the letter "V" with its axis horizontal; such beacons are arranged in pairs on each side of the channel, the points of the V's being toward the channel.

Harbour regulations.—The following are extracts from the harbour regulations for the harbours of the Philippine islands:—

1. All vessels on entering any port of entry or harbour shall show their colours and signal their official numbers or letters and keep them flying until boarded by the proper officials.

2. All vessels entering a harbour shall be considered in quarantine until boarded by the quarantine officer and given pratique by him. Until pratique is given the prescribed quarantine flag shall be kept flying at the fore.

3. All orders of the harbour master in connection with the berthing or movement of vessels shall be at once carried out by the master or other officer in charge of the vessel to which such orders relate.

4. All cases of sickness of a contagious or infectious character which may occur while the vessel is in port must be at once reported in writing to the quarantine officer.

5. Every vessel arriving in a port, having on board inflammable or explosive cargo, shall hoist a red flag at the fore truck, and shall keep such flag flying during the hours of daylight while any such cargo is on board, and shall display by night one *red* light at a height of not less than 20 feet (6^{m}1) above the deck. Such vessel shall anchor where indicated by the harbour master, and shall not change anchorage without his permission.

Digitized by Google

Chart 1263.

6. Should a pilot be required by any vessel, a regularly licensed pilot shall be furnished upon the display of the proper signal or upon application being made at the pilot station. Signal by day :—the pilot signal " PT " or flag G. of the International Code of Signals ; at night, a *blue* light *every fifteen minutes* or a *white* light flashed or shown at short intervals just above the bulwarks for about *one minute* at a time, or the signal " PT " in Morse code made by flashing lamp.

7. No refuse or other matter which might impede or obstruct navigation or cause an obstruction thereto shall be thrown from any vessel or floating craft of any kind into the waters of any harbour or into the navigable waters or any river tributary thereto.

8. Steam vessels towing shall have the right of way over steam vessels not towing ; provided, that steamers of over 10 feet (3m0) draught shall have the right of way in deep and narrow channels. In carrying out the rules for right of way, due regard shall be had to the fact that a vessel going against the tide or current is much more manageable than one going with it.

Pilotage.—Pilotage in the Philippine islands is optional.

Deratisation.—In accordance with Article 28 of the International Sanitary Convention of 21st June, 1926, Deratisation can be carried out, and Deratisations and Deratisation Exemption Certificates can be issued to vessels at Manila.

CURRENTS.—The surface currents of the China sea flow in accordance with the wind, so that the main currents are those caused by the monsoons and are reversed in direction with the change of monsoon. The south-westerly current of the North-east monsoon is stronger and more constant than the north-easterly current of the South-west monsoon, since the former is the stronger and more constant wind.

In the Figures of the General Surface Current Circulation the pecked arrows represent the probable trend of current in regions where few observations are available. The figures at the tail of each arrow give the average rate of the current in miles per day.

The predominant direction of flow during the North-east monsoon period is shown in Figure 1. The current, after setting south-westward through Formosa strait and along the southern coast of China, continues eastward of Hainan and is thence directed towards the coast of Annam, which it follows closely. In the southern part of the China sea, the direction changes gradually to southward, and subsequently to a little east of south as the current approaches Carimata strait; thence it passes south-eastward into the Java sea.

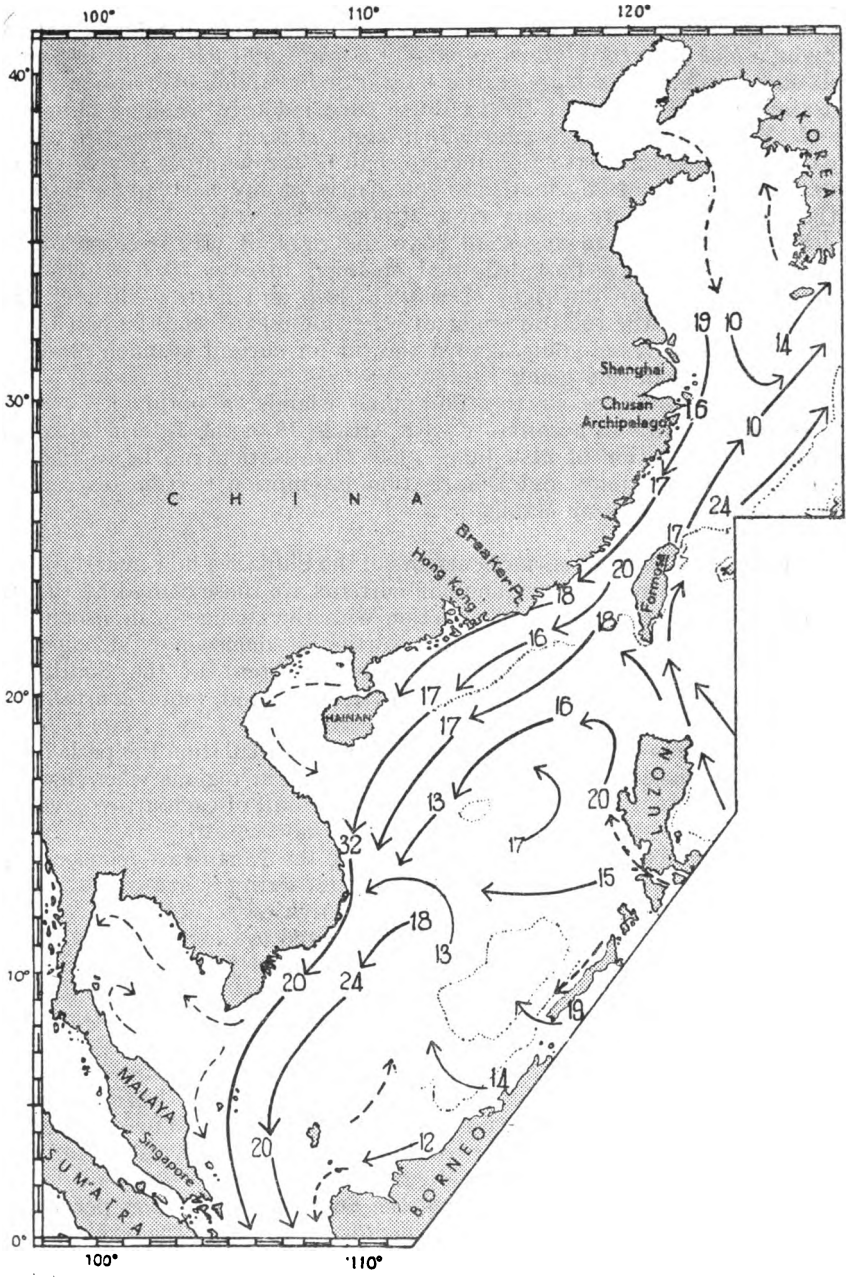
During the North-east monsoon period, some of the water of the Kuro shio, flowing northward along the east coasts of Luzon and Formosa, branches off to the westward and passes through Luzon strait into the China sea. This water, turning south-westward, passes into the general monsoonal flow (*see* Figure 1).

The predominant direction during the South-west monsoon period is shown in Figure 3. The current which has come from the Java sea turns northward through Carimata strait, beginning to turn north-eastward in about lat. 5° N. The general flow is thence north-eastward towards and through Formosa strait. Some of this water passes north-eastward through Luzon strait to enter the Kuro shio.

Offshoots of the monsoonal currents enter the Gulf of Thailand and Tongking gulf.

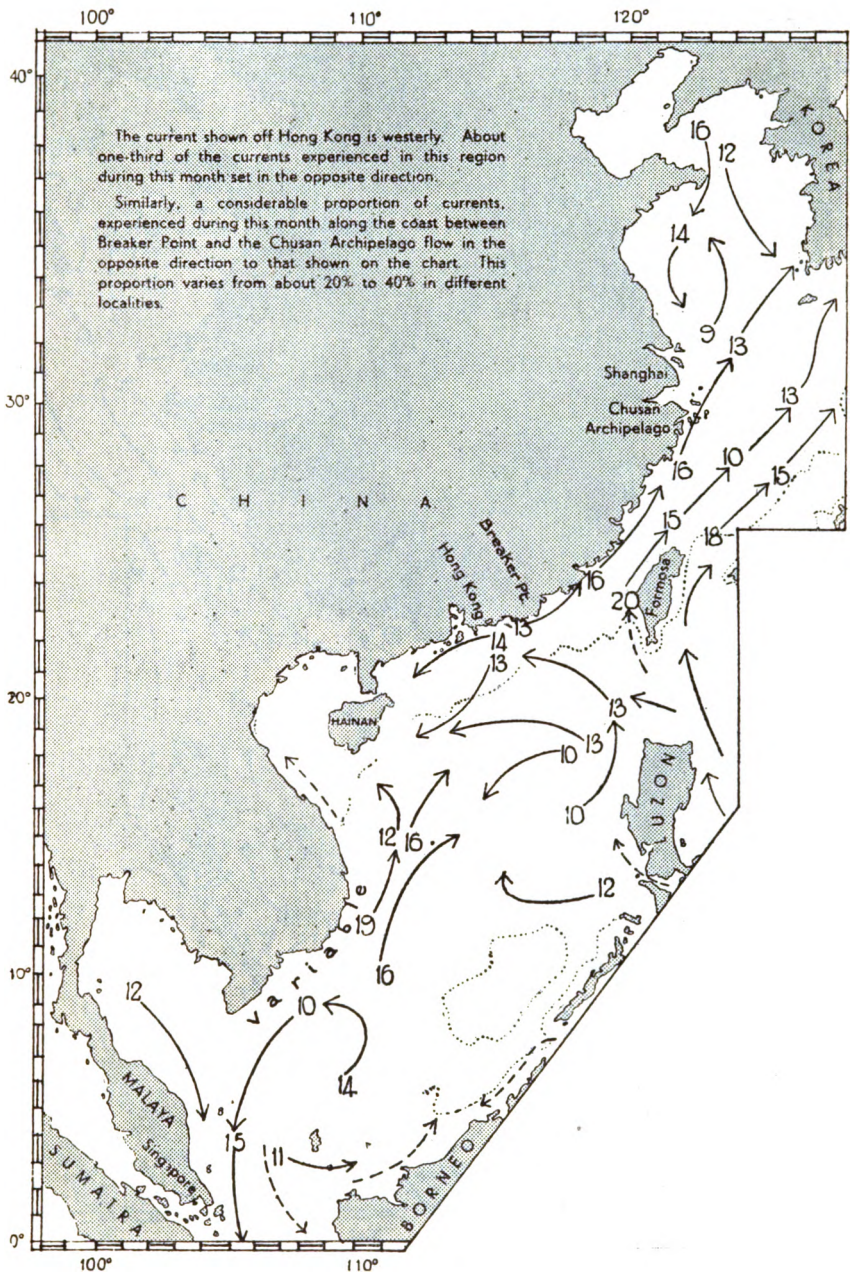
Digitized by Google

Fig. 1. January



Digitized by Google

Fig. 2. April

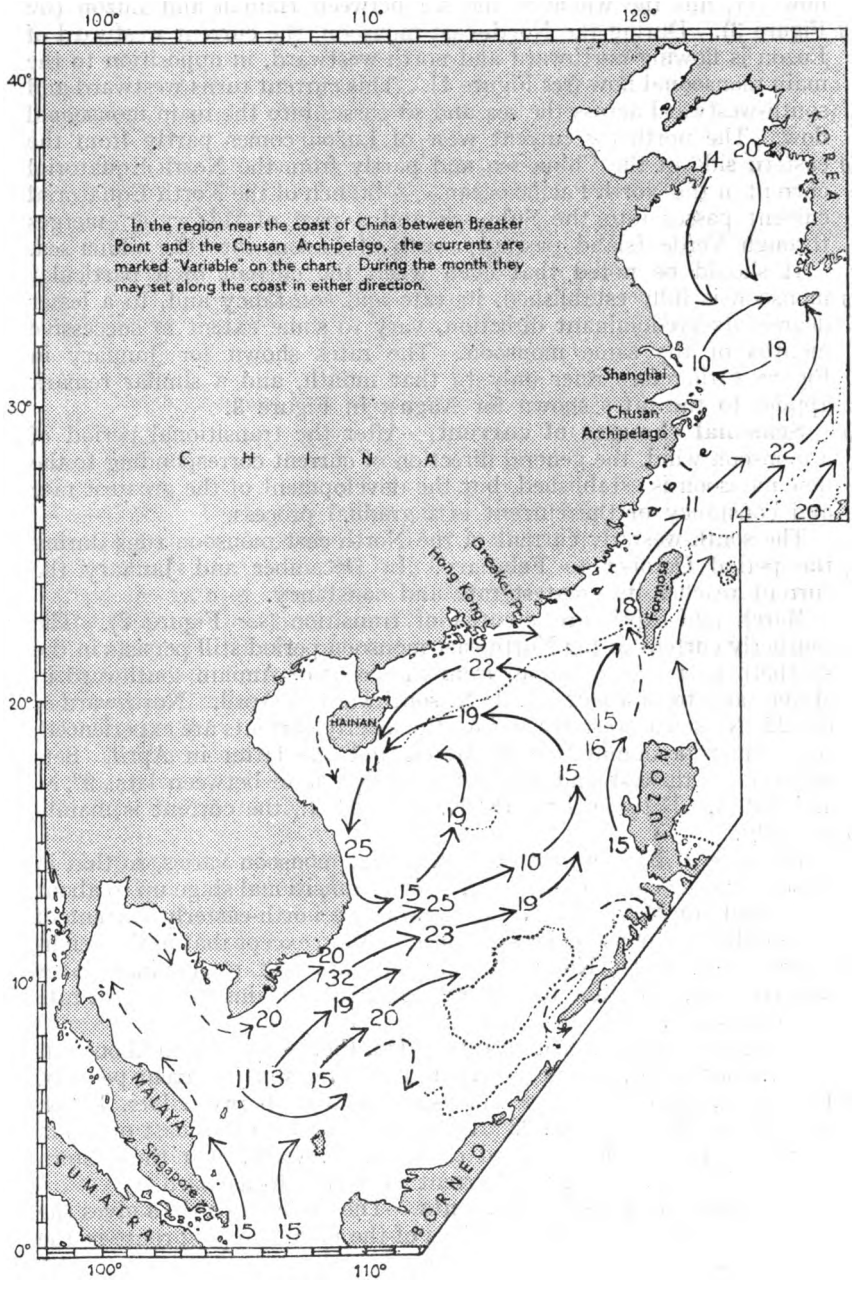

100°
110°
120°
40°
30°
20°
10°
0°
The current shown off Hong Kong is westerly. About one-third of the currents experienced in this region during this month set in the opposite direction.
Similarly, a considerable proportion of currents, experienced during this month along the coast between Breaker Point and the Chusan Archipelago flow in the opposite direction to that shown on the chart. This proportion varies from about 20% to 40% in different localities.
KOREA
Shanghai
Chusan Archipelago
C H I N A
Breaker Pt.
Hong Kong
Formosa
HAINAN
LUZON
BORNEO
MALAYA
Singapore
SUMATRA
Variable

Digitized by Google

Fig. 3. August

Digitized by Google

Fig. 4. September



Digitized by Google

Chart 1263.

The major current flows are therefore found in the western part of the China sea. The north-easterly current of the South-west monsoon, however, fills the whole of the sea between Hainan and Luzon (*see* Figure 3). During the North-east monsoon, the current westward of Luzon is flowing northward and north-westward, in opposition to the main monsoonal flow (*see* Figure 1). This current turns westward and south-westward across the sea and so passes into the main monsoonal flow. The northerly current west of Luzon comes partly from the eastern side of the China sea and partly from the North Equatorial current of the North Pacific ocean. A branch of the North Equatorial current passes into the Sulu sea and a part of this water emerges through Verde Island passage, south of Luzon, into the China sea.

It should be noted that even when the current of a particular monsoon is fully established, its rate and constancy and, to a lesser degree, its predominant direction, vary to some extent in successive months of the same monsoon. The rates shown for January in Figure 1 therefore refer only to that month, and a similar remark applies to the rates shown for August in Figure 3.

Seasonal changes of current.—After the transitional period of a monsoon wind, the general direction of current corresponding to the new monsoon is established, but the development of the greatest rate and constancy of the current is a gradual process.

The south-westerly current of the North-east monsoon runs during the period October to February. In December and January the current reaches its greatest rate and constancy.

March and April are months of transition (*see* Figure 2). The southerly current of the North-east monsoon period still persists in the southern part of the region, from the coast of Annam southward in March, and from about lat. 9° N. southward in April. Northward of lat. 22° N., south-westerly and north-easterly currents are experienced, the former predominating in March and the latter in April. Sets between north-west and north-east predominate between lats. 9° N. and 18° N. Between lats. 18° N. and 22° N., the current is mainly westerly.

The time of the onset of the South-west monsoon varies, so that in some years the currents may still be in a transitional stage up to about the middle of May. In average years, the north-easterly current of the South-west monsoon is established in May, except that in the neighbourhood of Hong Kong westerly currents still predominate over easterly ones. In June to August the current attains its greatest rate and constancy.

September is the transition month (*see* Figure 4). From about lat. 13° N. southward, the northerly and north-easterly current persists. This passes into a counterclockwise circulation between lats. 13° N. and 22° N. North of lat. 22° N., the currents near the coast of China may set either north-eastward or south-westward. On the eastern side of Formosa strait, the current flows north-eastward.

Summary of Monsoon currents.—The table on page 13 gives the monsoon periods on various sections of the main shipping route in the China sea.

Strength of current.—The following remarks on strength and constancy of current are based on observations received for the period 1855 to 1939, and refer to the main flow of the monsoonal currents, on the western side of the China sea, southward of Hong Kong. A considerable proportion of currents in both monsoons exceeds the rate

Digitized by Google

Chart 1263.

	Current of the South-west Monsoon	Transition	Current of the North-east Monsoon	Transition
Lat. 0° N. to 8° N. .	May to September	—	October to April	—
Lat. 9° N. to 13° N. (Coasts of Cochin China and Annam)	May to September	—	October to March	April
Lat. 14° N. to 21° N. .	May to August	September	October to February	March, April
Region of Hong Kong	June to September	—	October to May*	—
Western side of Formosa strait	April to August†	September	October to March†	—

* In March, April and May, about one-third of the currents set in the opposite direction.

† In March and April, about one-third of the currents set in the opposite direction.

of one knot. During the height of the North-east monsoon, in December and January, between lats. 4° N. and 16° N., including the region off the coast of Annam, 36 to 38 per cent. of all currents observed exceed the rate of one knot. In August, in the same region, 30 to 32 per cent. of all currents exceed this rate. The highest average rate of current in the North-east monsoon is 40 miles per day, in December, off the coast of Annam. The highest average rate in the South-west monsoon is 28 miles per day, in August, eastward of the coast of Annam (*see* Figure 3).

A small proportion of currents exceed the rate of 2 knots. The highest percentage of these occur off the coast of Annam, between lats. 12° N. and 16° N., 8 per cent. in December and 5 per cent. in July.

The proportion of stronger currents is thus somewhat greater during the North-east monsoon period. A few currents exceeding the rate of 3 knots have been recorded between lats. 4° N. and 16° N., in July, August and October.

Constancy of current.—Monsoon currents have a considerable degree of variability, and even in the height of each monsoon, currents may at times be experienced running in the opposite direction to the monsoon current, or, in general, in any other direction round the compass. In either monsoon, the wind fluctuates considerably in strength, owing to variations in the distribution of atmospheric pressure. Other winds may also intervene for a time; in these are included the winds of depressions and typhoons. The North-east monsoon is stronger and less liable to interruption than the South-west monsoon. This accounts for the fact, above stated, that the currents of the North-east monsoon period are somewhat stronger than those of the South-west monsoon period. For the same reason, the constancy of the currents is greater in the former period.

The constancy of the current varies not only as between the two monsoons, but also in different localities and in different months during the same monsoon period. The most constant period of the North-east monsoon current is in January (*see* Figure 1), from Formosa strait to

Digitized by Google

Chart 1263.

lat. 4° N. The most constant part of the South-west monsoon current is eastward of the coast of Annam, between lats. 8° N. and 14° N., in August (*see* Figure 3).

The eastern part of the China sea.—Eastward of the main shipping route in the western part of the sea, the number of available current observations is much fewer. In the region southward of about lat. 12° N., and eastward of the main flow of monsoonal current, the currents experienced are more variable throughout the year. The following remarks refer to the general trend of current in the open sea in this region.

In the South-west monsoon (*see* Figure 3), the north-easterly current in the western part of the sea sends off branches along its course, which set eastward, and subsequently south-eastward, into the eastern part of the sea. These branches appear to be more marked in June and July than in August.

In the North-east monsoon (*see* Figure 1), there appears to be a northerly trend of current which turns westward and passes into the main south-westerly flow in the western part of the sea.

West coasts of Borneo and Palawan.—The number of available observations in this region is also small. The currents are influenced by the monsoons, but are variable and often weak, seldom running at any great rate. During the South-west monsoon there is frequently no appreciable current in Palawan passage. In either monsoon, the current may not be in the same direction along the whole extent of both these coasts at the same time.

Subject to these remarks, the general trend of current appears to be as follows. During the South-west monsoon, in May to July, there is a predominance of current setting northward along the coast and towards the land, as a direct result of the monsoon. In August and September, the current is more variable with some predominance of southerly current along the coast, particularly off the coast of Palawan.

In November, the predominant current is again northward, apparently as a result of the main southerly monsoonal flow sending off a branch to the eastward, which turns north-eastward along the west coast of Borneo.

In the North-east monsoon, from December to March, there is some predominance of southerly current along the coasts, chiefly off the coast of Palawan, in lat. 9° N. to 11° N. and off the coast of Borneo in lat. 3° N. to 5° N. The chief feature of this season is, however, the prevalence of north-westerly currents, or other offshore currents with a westerly component, from December to April, between lats. 4° N. and 11° N. These currents, which may at times reach a rate of about 20 miles per day, are especially prevalent in January and February in the region of Balabac strait, owing to the flow of water through this strait from the Sulu sea into the China sea.

Caution.—This north-westerly current has caused casualties in the past, when ships have been stranded on Royal Captain shoal, in Palawan passage. The possibility of the occurrence of such a current at any time during the North-east monsoon period and especially in the region of Balabac strait and the southern part of the Palawan passage should be borne in mind.

Passages on the western side of the Sulu sea.—Observations are insufficient to give exact information about the set of current through Balabac strait, Mindoro strait and Verde Island passage. The currents

Digitized by Google

Chart 1263.

are variable and often indefinite and depend upon the wind blowing at the time. The following predominant trends of current appear from the information available.

Verde Island passage—West-going, November to May. East-going, July to October.

Mindoro strait—West-going, January to June. East-going, July to November.

Balabac strait—West-going, December to March. East-going, September to November. Tidal streams are superimposed on the currents in this strait.

West coast of Luzon.—Off this coast, the north-easterly current of the South-west monsoon flows. During the North-east monsoon, the predominating direction is north to north-west. The predominating direction may therefore be summarised as follows:—November to April, north to north-west; May, transition; June to October, north to north-east.

The currents are subject to a considerable degree of variability. The current sometimes runs southward along the coast; whether running northward or southward it is always with a decided tendency towards the coast.

Effect of a tropical revolving storm on the current.—In the vicinity of a tropical revolving storm the set and drift of current may be markedly different from that normally to be expected. Comparatively little is known about such currents, particularly near the centre of the storm, since navigators avoid the centre whenever possible and conditions within the storm field generally are unfavourable to the accurate observation of current.

The primary cause of the currents is the strong wind associated with the storm; the strength of current produced by a given force of wind varies with latitude and is greatest in low latitudes. For the latitudes of tropical storms, say 15° to 25°, a wind of force 10 would produce a current of about one knot. It is believed that the strength of the currents of tropical storms is, on the average, the same as that which wind of similar force, unconnected with a tropical revolving storm, would produce. These currents, at the surface of the water, set at 45° to the right of the wind direction (in the northern hemisphere) and therefore flow obliquely outward from the storm field, though not radially from the centre.

Unless due allowance is made for these sets, very serious errors in reckoning may therefore arise. It is reported that, in one case, a vessel experienced a south-easterly set of more than 50 miles, under conditions when the set normally to be expected was south-westerly. In another case, an unexpected south-south-westerly set of 60 miles was experienced in 18 hours. These are examples of currents of abnormal strength, which are occasionally met in the vicinity of tropical revolving storms, and which cannot be accounted for by the wind strength. The possibility of such an experience should be borne in mind, particularly near, say within 100 miles of the centre of the storm.

Other currents, not caused directly by the wind, may flow in connection with these storms but are probably weak and therefore negligible in comparison with the wind current.

The above remarks apply to the open ocean. When a tropical storm approaches or crosses an extended coastline, such as that of Florida, a strong gradient current parallel to the coast will be produced by the

Digitized by Google

Chart 1263.

piling of water against the coast ; the sea-level may rise by as much as from 8 to 15 feet (2^m4 to 4^m6) on such an occasion.

Whether the storm is in the open ocean or not there is a rise of sea-level inwards to its centre which compensates for the reduction of atmospheric pressure. The extent of this rise is never great, from one to two feet according to the intensity of the storm ; it produces no current so long as the storm is not changing in intensity. If the storm meets the coast, however, the accumulation of water at its centre will enhance the rise of sea level at the coast mentioned above and so produce a stronger gradient current along the coast.

SIGNALS.—Storm signals.—The following system of storm signals is in use in the Philippines. The signals are shown in accordance with advices received from the Weather Bureau.

DAY SIGNALS.

Signal	*Symbol*	*Meaning*
1	T	(*a*) Indications of a distant typhoon, the direction of movement of which is still unknown. The signal will be changed in case the typhoon becomes more threatening. (*b*) Typhoon, the direction or distance of which is at present such, that it may pass off without seriously affecting the archipelago. (*c*) Depression of little importance, though it may develop later into a typhoon.
2	—	Centre of typhoon will pass or is passing northward at a considerable distance. Strong winds from the SW. quadrant (west to south), which may acquire considerable force and continue for several days.
3	⊥	Centre of typhoon will pass or is passing southward at a considerable distance. Strong winds from the east quadrant (north-east to south-east), which may acquire considerable force.
4	◆	Typhoon dangerous, though the danger is not yet imminent. Look out for the next signal.
5	▲	Gale expected from the NW. (North to west).
6	▼	Gale expected from the SW. (South to west). Centre of typhoon will pass or is passing northward at a short distance. Strong gales from the NW., and especially from the SW. quadrants, which may reach hurricane force. In rare cases of typhoons coming from the China sea and moving north-eastward, the wind will veer from SE., through south, to NW.
7	▲ ▲	Gale expected from the NE. (North to east).

Digitized by Google

DAY SIGNALS.

Signal	*Symbol*	*Meaning*
8	▼ ▼	Gale expected from the SE. (South to east). Centre of typhoon will pass, or is passing, southward at a short distance. Strong gales from the NE., and especially from the SE. quadrants, which may reach hurricane force. In rare cases of typhoons coming from the China sea and moving north-eastward, the wind will back from SE., through east, to north.
10	+	Centre of typhoon will pass, or is passing, over or very near the place.

Note.—No. 9 signal is used in Hong Kong only.

NIGHT SIGNALS.

1	2	3	4	5
WHITE	WHITE	GREEN	WHITE	WHITE
WHITE	GREEN	WHITE	WHITE	GREEN
WHITE	WHITE	GREEN	RED	GREEN

6	7	8	10
GREEN	GREEN	WHITE	RED
WHITE	GREEN	WHITE	GREEN
WHITE	WHITE	GREEN	RED

On any one of the above-mentioned signals being made, mariners should take every possible precaution to ensure the safety of their vessels.

Harbour signals.—*Philippine islands.*—The following signals or calls shall be used and recognised at Philippine ports of entry:—

Customs.—Flags E H C of the International Code of Signals; at night, three or four short blasts of the whistle and waving of a light.

Quarantine.—The signal as laid down in the International Code of Signals.

Pilot.—The signal as laid down in the International Code of Signals.

Explosives or inflammables.—Flag B of the International Code of Signals at fore.

Medical assistance.—Flag Q of the International Code of Signals.

Infectious or contagious disease.—Flags E Z Q of the International Code of Signals.

Death.—Flags E N L of the International Code of Signals, or signals given for Customs or Quarantine.

Distress.—The signal as laid down in the International Code of Signals.

Mail.—Flag Y of the International Code of Signals.

Water boat.—Flags R C Q or F U of the International Code of Signals.

Harbour police.—Customs signal.

Harbour master.—Flag G Y T of the International Code of Signals.

Digitized by Google

Manœuvring.—Flag D of the International Code of Signals; at night a *red* light four feet vertically below the *white* anchor light.

Oost-Indische Archipel.—The following flag signals may be used in the harbours of Oost-Indische Archipel, in addition to those laid down in the International Code of Signals:—

A.—Displayed onshore.—	
Third pendant A *	Your berth is pier I
,, ,, B *	,, ,, ,, II
,, ,, C *	,, ,, ,, III
,, ,, D *	,, ,, ,, IV
,, ,, E *	,, ,, ,, V
,, ,, F *	,, ,, ,, VI
,, ,, G *	,, ,, ,, VII
,, ,, R *	You must anchor in the road.
Blue flag	No communication owing to bad weather.
Stream signals:—	
White flag	Slack water.
Blue flag	Ebb or out-going tide.
Red flag	Flood or in-coming tide.
B.—Displayed onboard.—	
Third pendant H	I need dock assistance.
Second ,, M	Please send a motor boat.
Third ,, J	Water flag.
First ,, N	I have passengers from outside Oost-Indische Archipel who wish to disembark.
Second ,, V	I require an ash boat.
Third ,, Q	I have one or more suspected cases of infectious disease on board, or taken on board during the voyage.
At night, a *red* light above a *white* light, 6 feet (1m8) apart. This signal to be shown only within or near the limits of the harbour or roadstead.	

Flag B of the International Code of Signals (I am loading or unloading inflammable material or explosives) can also be used to denote "I am loading or unloading light inflammable material."

Vessels requiring the company doctor can display their company flag above flag W of the International Code of Signals.

*When two or more vessels are entering a harbour at the same time, the berthing signal for one particular vessel can be indicated by hoisting the company or national flag of that vessel below the signal.

Pilot signals.—Pilotage signals for the various harbours and coasts in Oost-Indische Archipel, which apply to light-vessels equipped to show signals connected with the pilot service, are as given hereafter. The term "by day" indicates between sunrise and sunset, and "at night" indicates the remainder of the 24 hours.

The following signals are to be made by vessels entering and requiring a pilot:—

By day: (*a*) The National flag, surrounded by a white border one-fifth the breadth of the flag, hoisted at the foremast head.

or (*b*) The pilot signal "P.T." of the International Code of Signals.

Digitized by Google

or (*c*) Flag "G" of the International Code of Signals.
or (*d*) The distant signal, consisting of a cone point upwards, having above it two balls or shapes resembling balls.

At night: (*a*) A *blue* light *every fifteen minutes*.
(*b*) A bright *white* light, flashed or shown at short intervals, just above the bulwarks, for about *one minute* at a time.
(*c*) The signal "P.T." in the Morse code made by flashing lamp.

The above signals must be shown until the pilot is on board, or until an answering signal has been made.

Vessels arriving at night, but not wishing to enter at night, shall show the pilot signal at daybreak.

The following signals are made by pilot lightships to entering vessels displaying the pilot signal:—

Day signal.	Night signal.	Signification.
None.	*White* flare or swinging a *white* light.	The pilot will proceed to the vessel at once.
Flag "D" of the International Code of Signals or a cone, point upwards, surmounted by a ball.	A *red* light above a *white* light.	No pilot is available on board the pilot lightship; the vessel may enter without a pilot until one is met.

Communication signals.—The following signals apply to all harbours in Oost-Indische Archipel, and are shown on the signal masts, in the harbours and/or the look-out stations.

Day signal.	Night signal.	Signification.
Three red balls, disposed vertically.	Three *red* lights, disposed vertically.	Vessels are absolutely prohibited from entering. (N.B. This signal is only made in exceptional circumstances.)
A cone, point up, with a ball above and a ball below.	A *white* light between two *red* lights, disposed vertically.	Entering prohibited.
A ball, surmounted by two black cones, points together.	*A white* light, with a *green* light above it and a *red* light below it.	Entering and leaving prohibited.
A cone, point down, surmounted by two cones, points together.	*A white* light between two *green* lights, disposed vertically.	Leaving prohibited.

Signal to be made by vessels when inconvenienced by searchlights.—In the event of the navigation of a vessel being inconvenienced by the glare from searchlights near a port in the British Empire, she should make the International Code signal ZO (— — · · — — —) by lamp and by whistle, siren or fog horn.

Both the light and sound signals should be employed, whenever possible, and should be repeated until the inconvenience is removed.

Only real urgency should necessitate the use of this signal as, unless

Digitized by Google

the vessel is actually in the rays of a searchlight, it is not possible for the operators to know which projector is affected.

This signal is designed to assist mariners ; no liability whatever will be admitted.

This signal should also be used in similar circumstances near ports in other countries.

SUBMARINE CABLES.—The following articles are taken from the International Convention for the Protection of Submarine Telegraph Cables of 14th March, 1884.

II. It is a punishable offence to break or injure a submarine cable, wilfully or by culpable negligence, in such a manner as might interrupt or obstruct telegraphic communication, either wholly or partially, such punishment being without prejudice to any civil action for damages.

This provision does not apply to cases where those who break or injure a cable do so with the lawful object of saving their lives or their ship, after they have taken every necessary precaution to avoid so breaking or injuring the cable.

V. Vessels engaged in laying or repairing submarine cables shall conform to the regulations as to the signals which have been, or may be adopted by mutual agreement among the High Contracting Parties with a view to preventing collisions at sea.

When a vessel engaged in repairing a cable exhibits the said signals, other vessels which see them, or are able to see them, shall withdraw or keep beyond a distance of one nautical mile at least from the ship in question, so as not to interfere with her operations.

Fishing gear and nets shall be kept at the same distance.

Nevertheless, fishing vessels which see, or are able to see, a telegraph-ship exhibiting the said signals, shall be allowed a period of twenty-four hours at most within which to obey the notice so given, during which time they shall not be interfered with in any way.

The operations of the telegraph-ships shall be completed as quickly as possible.

VI. Vessels which see, or are able to see, the buoys showing the position of a cable when the latter is being laid, is out of order, or is broken, shall keep beyond a distance of one quarter of a nautical mile at least from the said buoys.

Fishing nets and gear shall be kept at the same distance.

VII. Owners of ships or vessels who can prove that they have sacrificed an anchor, a net, or other fishing gear in order to avoid injuring a submarine cable, shall receive compensation from the owner of the cable.

In order to establish a claim to such compensation, a statement, supported by evidence of the crew, should, whenever possible, be drawn up immediately after the occurrence, and the master must, within twenty-four hours after his return to or next putting into port, make a declaration to the proper authorities.

The latter shall communicate the information to the Consular authorities of the country to which the owner of the cable belongs.

Caution.—Cautionary notes appear on many charts, calling attention to areas in which there are submarine telegraph cables ; these areas are indicated by pecked lines on the charts.

Every care should be taken to avoid anchoring in such areas, even though there may be no specific prohibition against so doing, in view of the serious interference with communications which results from

Digitized by Google

damage to submarine cables. Equal care should be taken whenever the symbol for a submarine cable (a wavy line) is shown on the chart.

Danger involved in cutting a submarine cable to clear anchors or fishing gear.—In the event of any vessel fouling a submarine cable, every effort should be made to clear the anchor or gear by normal methods; should these efforts fail, the anchor or gear should be slipped and abandoned *without attempting to cut the cable. High voltages are, or may be, fed into certain submarine cables; serious risk exists of loss of life due to electric shock, or at least of severe burns if any attempt to cut the cable is made.* No claim in respect to injury or damage sustained through such interference with a submarine cable will be entertained.

Compensation for anchors or fishing gear sacrificed in order to avoid injuring a cable can be claimed under the Submarine Telegraph Act of 1885 (Schedule of Submarine Telegraph Convention, Article VII).

NETHERLANDS SUBMARINES.—Netherlands vessels, which are carrying out exercises with submarines or are escorting submerged submarines, display a red flag at the masthead.

All vessels must give a wide berth to the vessel displaying a red flag at the masthead.

A vessel which, for any reason, finds it necessary to approach the vessel displaying a red flag, must proceed at slow speed until the latter vessel has indicated the danger zone by means of flag or other signals, or by megaphone.

In every case, in these circumstances, a good look-out must be kept for submarines which may have only the periscope above water.

RADIO STATIONS.—The following coastal Radio stations are open for general public correspondence in the area covered by this volume:—Kuching and Miri in Saráwak; Labuan; Jesselton and Kudat in the State of North Borneo; and Manila in the Philippines.

For details, *see* List published by the General Secretariat of the International Telecommunication Union.

For details of radio stations which transmit weather bulletins, storm signals, navigational warnings, time signals, etc., *see* Admiralty List of Radio Signals.

AIR LIGHTS.—Mariners are warned that lights (with definite characteristics), which are not ordinary navigation aids, may be exhibited for the use of aircraft from structures near the coasts described in this volume.

These lights are often of great luminous power and altitude and may be the first lights or looms of lights sighted when making a landfall at night; they normally have the following characteristics:—

(*a*) *Flashing white* (revolving beam type).

(These lights are usually screened from seaward, but their looms may be visible.)

or (*b*) *Alternating flashing white and green* (revolving beam type).

or (*c*) *Flashing two letter groups* in the Morse Code, in *red* or *green*.

(Although the groups made by these lights may have definite meanings in the International Code of Signals, their signification is to be disregarded; the fact that they are *red* or *green* in colour, and flash with mechanical regularity, should prevent their being mistaken for signals from shore signal stations or ships.)

Air lights which appear likely to be visible from seaward will be

Digitized by Google

shown on charts and described in the Admiralty List of Lights. As they are subject to changes of which prompt notification to the mariner may not always be possible, care should be taken that they are not confused with marine navigational aids.

STANDARD TIME.—All information regarding Standard times and Summer times will be found in the Admiralty List of Radio Signals, Vol. II.

COAL AND FUEL OIL.—Large quantities of coal are available at Manila and Cavite, and smaller quantities at Kuching and Olongapo. Large stocks of fuel oil are available at Manila, Cavite and Miri.

REPAIRS.—There are dry docks at Pontianak and Kuching, a floating dock at Olongapo, and patent slips at Cavite and Manila; for dimensions of largest dock or patent slip, *see* Appendix I.

Repairs to vessels and machinery can be effected at Pontianak, Kuching, Miri, Cavite and Manila.

CONSUL.—In addition to the Envoy Extraordinary and Minister Plenipotentiary, a British Consular officer resides at Manila.

PASSAGES.—For general information about passages through the China sea, *see* "Ocean Passages for the World."

Caution.—Towards the centre of the southern part of the China sea there exists a considerable area of unsurveyed and dangerous ground, known to be encumbered with coral reefs and shoals. This area is enclosed by a dotted line on the charts, and it should be avoided by all vessels.

Vessels are recommended to follow the routes indicated on the charts of the China sea, as far as practicable.

In navigating the waters of the Philippine islands during the rainy season a sharp look-out must be kept for flotsam; trees of immense size will frequently be met with afloat. In one case, near Marinduque island, a group of trees, still upright, was adrift, which resembled an island.

Chart 1263.

CLIMATE AND WEATHER.—General remarks.—Articles 1, 2, 3 and 4 in the General Meteorology section of the preliminary pages are appropriate to this Pilot.

The climate of this region is hot and damp, and the rainfall is abundant. The North-east monsoon prevails from October to April in the north, and from November or December to April in the south, and reaches Beaufort force 7 or more on 4 to 6 days per month from November to January in the north. The South-west monsoon is predominant from June to September.

On an average about four severe typhoons affect the region in a year, occurring most often from June to November, but very rarely from January to April. They are the greatest meteorological danger to navigation in these waters, since coastal fog is uncommon and sea fog is very infrequent.

Pressure.—In the southern part of the region covered by this Pilot, mean pressure is about 1009 mb. throughout the year, but in the northern part there is a seasonal variation associated with the large variation from winter to summer over Asia, mean pressure over north-

Digitized by Google

Chart 1263.

ern Luzon being about 1014 mb. from December to March, and about 1006 mb. in July and August.

In addition to irregular fluctuations due to variations in the intensity and position of the winter anticyclone over Asia, and to typhoons passing across or near to the Philippines, principally in summer and autumn, there is a regular diurnal variation with maxima at about 0900 and 2200 or 2300, and minima at about 0300 or 0400 and 1500 or 1600, local time, the range of variation being about 3½ mb. at Manila.

The accompanying diagram shows the equivalent of millibars in inches, and vice-versa.

The following table gives the corrections in millibars to be applied to the observed pressure to allow for diurnal variations.

Local Time	0	1	2	3	4	5	6	7
0–10° N. . . .	− 0·6	− 0·1	+ 0·4	+ 0·7	+ 0·8	+ 0·7	+ 0·2	− 0·3
10° N.–20° N. . .	− 0·5	− 0·1	+ 0·4	+ 0·7	+ 0·7	+ 0·5	+ 0·1	− 0·4
Local Time	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**
0–10° N. . . .	− 0·9	− 1·3	− 1·4	− 1·2	− 0·7	0·0	+ 0·7	+ 1·3
10° N.–20° N. . .	− 0·8	− 1·2	− 1·2	− 1·0	− 0·5	+ 0·1	+ 0·7	+ 1·2
Local Time	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**
0–10° N. . . .	+ 1·5	+ 1·5	+ 1·1	+ 0·5	− 0·2	− 0·7	− 1·0	− 0·9
10° N.–20° N. . .	+ 1·3	+ 1·2	+ 0·9	+ 0·3	− 0·2	− 0·7	− 0·9	− 0·8

If the barometer reading is as much as 3 mb. below the normal for the time of day and for the month in question, this should be regarded as a warning that a typhoon may be forming or approaching the ship (*see* standard article on tropical revolving storms, page xxxvi).

Wind.—*North-east monsoon.*—(*See* Figure 1).—In winter while mean pressure is high over Asia, the north-easterly winds of the North-east monsoon are very persistent, but south of about latitude 5° N. the direction is more northerly than north-easterly. This monsoon is established by October in the north, but not generally until December in the south; it continues until the end of April. South of about lat. 10° N. the time taken for this monsoon to become well established is about two months, but about a fortnight suffices for its replacement by the South-west monsoon in May.

In Figures 1 and 2 the arrows show the direction of the predominant wind, if its constancy is at least 51%, according to the following scheme :—

⇢ 51–60% → 61–80% ⟹ 81–100%

Digitized by Google

Fig. 1. MEAN PRESSURE AND PREDOMINANT WINDS—JANUARY

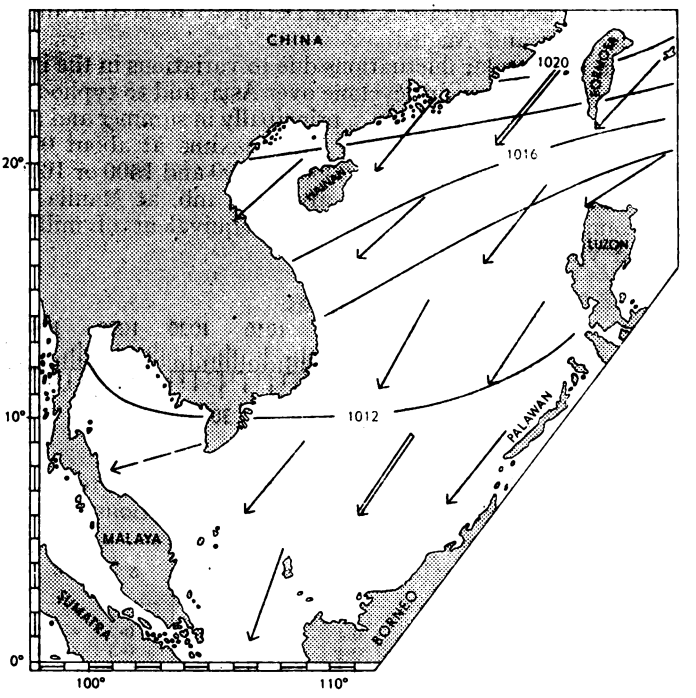
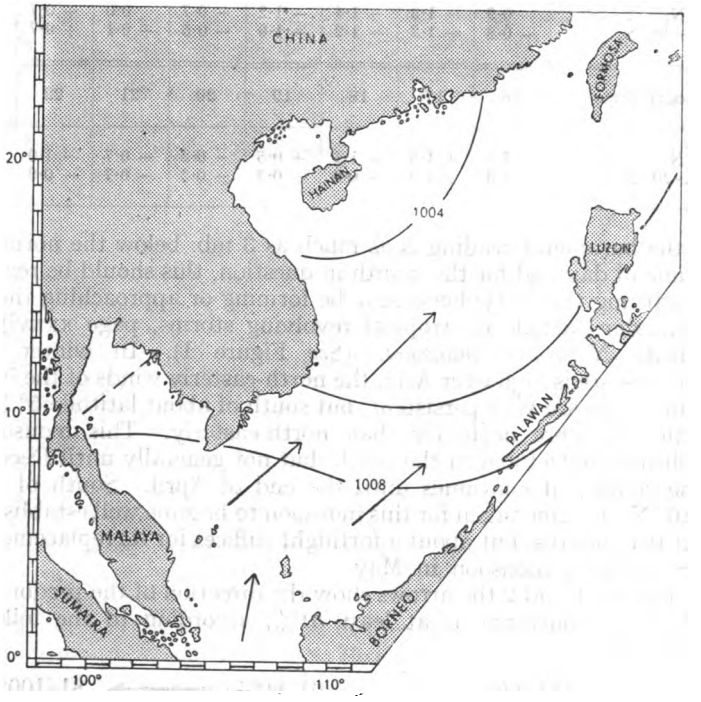


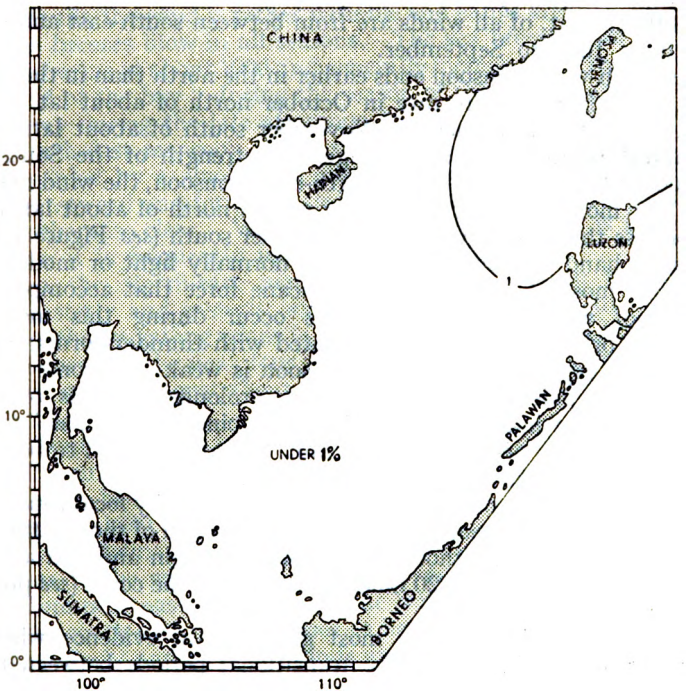
Fig. 2. MEAN PRESSURE AND PREDOMINANT WINDS—JULY



Digitized by Google

Fig. 3. PERCENTAGE FREQUENCY OF GALES (BEAUFORT FORCE 7 OR OVER)—DECEMBER

Fig. 4. PERCENTAGE FREQUENCY OF GALES (BEAUFORT FORCE 7 OR OVER)—MAY



Digitized by Google

Chart 1263.

Predominance is judged in relation to that quadrant (90°), not necessarily bounded by the four cardinal points, which shows the greatest number of winds. Only winds of force 3 or more are taken into account in estimating predominance. The arrow shows the direction bisecting the quadrant, and the constancy is defined as the percentage relation between the number of winds from that quadrant, of forces 3–12, and the total number of winds observed from all directions (including forces 0–2).

Twenty miles or more from the coast, at the height of this monsoon nearly 90 per cent. of all winds are from between north and east. They often blow strongly in the north, reaching Beaufort force 7 or more on 4 to 6 days per month from November to January. This freshening of the monsoon often occurs in the rear of shallow depressions moving eastward or north-eastward from China towards Formosa and Japan (*see* standard article on "lows," page xxxiv). The frequency of strong winds decreases southward, and south of about lat. 5° N. there is, on an average, less than one day per month on which force 7 or more is reached (*See* Figure 3).

The north-easterly gales off the west coast of Luzon are generally associated with a rise of the barometer and bright weather, cloudier skies often being visible northward.

South-west monsoon.—(*See* Figure 2.) In summer, while mean pressure is low over Asia, the south-westerly winds of this monsoon prevail, but they are not quite so persistent as are those of the North-east monsoon ; south of about lat. 5° N. the direction is more southerly than south-westerly.

Twenty miles or more from the coast, between about latitudes 10° N. and 20° N., from June to September, about 60 per cent. of all winds are from between south and west, while between about latitudes 5° N. and 10° N. this frequency is about 80 per cent. South of about lat. 5° N., 70 to 80 per cent. of all winds are from between south-east and south-west from June to September.

The South-west monsoon ends earlier in the north than in the south ; south-westerly winds are rare in October north of about lat. 15° N., but are still fairly frequent in November south of about lat. 10° N.

Coastal winds.—On an average, the strength of the South-west monsoon is less than that of the North-east monsoon, the wind reaching force 7 or more on about 3 days per month north of about lat. 5° N., and on less than one day per month farther south (*see* Figure 4). On the other hand, although the wind is normally light or moderate at this time, most of the winds of hurricane force that accompany the passage of well-developed typhoons occur during this monsoon ; moreover, brief squalls, often associated with thunderstorms, are not uncommon, especially when the monsoon is weak, and some of these squalls reach gale force. Occasionally, prolonged periods of strong south-westerly wind, known in the Philippines as "collas" occur ; they are generally accompanied by rain, and are believed to be due to typhoons north-eastward of the archipelago.

Near the coast the monsoons are much modified by local topography and by land and sea breezes (*see* Local modification of the weather near the coast, page xlvi), although the monsoons begin and end at about the same times as they do 20 miles or more from the coast (*see* previous sections).

Land and sea breezes are most generally in evidence when the monsoons are weak, and in the transitional periods between them ;

Digitized by Google

Chart 1263.

such breezes are also prominent on coasts sheltered from the monsoon, e.g. on the north coast of Luzon during the South-west monsoon and on the western coasts of Luzon during the North-east monsoon. Where the monsoon is of moderate strength these breezes may deviate, reinforce or weaken it, but with a strong monsoon land and sea breezes are not noticeable.

On the west coast of Borneo in the regions of Montrado, Singkawang and Pemangkat, during the northerly monsoon, the wind is often deviated to north-west during the daytime by the sea breeze, and to north-east at night by the land breeze, while during the southerly monsoon the wind is often south-west by day and south-east by night.

On the north-west coast of Palawan, land and sea breezes are almost the only winds in May and early June, the former blowing from south-east and south, and the latter from north-west and north. During the latter half of June the South-west monsoon sets in and the winds are mainly south-west and west until October. During the South-west monsoon there are periods with strong winds from west-south-west and much rain ; a slight fall of the barometer often indicates the approach of this stormy weather, which may last some days. This type of weather also occurs sometimes in November and December.

On the west coast of Luzon the North-east monsoon decreases in strength from February to April and the wind tends to become more easterly. During this monsoon the wind usually backs to north-north-east or north during the day under the influence of the sea breeze, but sometimes calms or westerly breezes are experienced between 1000 and sunset. During May the wind is mostly light and variable, but strong winds from south-east or south-west may occur, especially in Manila bay and the Lingayen gulf. The South-west monsoon is deviated by the land and sea breezes even more than is the North-east monsoon.

At Manila the wind is rather variable and calms are frequent. Land and sea breezes blow in all seasons. The sea breeze from south-west usually begins at about 1000 and generally increases in strength towards the head of the bay ; during the season of the North-east monsoon it gives way during the late afternoon to the prevailing wind direction. The North-east monsoon blows strongly out of Manila bay at times, accompanied by a smoke-like cloud which is driven out of the bay south-westward and forms an arch on the south-west horizon, the sky being otherwise clear. When the North-east monsoon is fresh at the entrance it is frequently moderate within the bay.

When the North-east monsoon begins to weaken in February, south-easterly and easterly winds become more frequent at Manila ; they are the prevailing winds in March and April, but gradually become less frequent in the next four months. In May south-westerly winds increase, and in August about two-thirds of all winds are from between south and west.

At Manila the wind is usually strongest from 1200 to 1500, July and August being the windiest months. Hourly speeds of 38 knots or more have been recorded in July, August and September, and in September, 1890, one of 54 knots.

At Cape Bolinao the topography of the Lingayen gulf controls the direction of the wind, which is mainly south-east in all months ; the high mountains eastward obstruct the North-east monsoon and deviate it to the south-east or sometimes to north. From May to September south-westerly and westerly winds are not uncommon, but south-east

Digitized by Google

Chart 1263.

is still the prevailing direction. Land and sea breezes are felt along the coast of the gulf.

At Cape Bojeador the monsoons prevail as on the open sea. Calms are infrequent, and from October to January the mean force of the wind here is twice as great as at Cape Bolinao.

Squalls.—At sea, squalls are most frequent in the periods between the monsoons, and are often associated with thunderstorms. They are infrequent during the North-east monsoon north of about lat. 10° N., and especially north-westward of Luzon.

Near the coast squalls may occur at any time. The most dangerous are " arch squalls." When clouds are seen rising from the horizon in the form of an arch, one of these squalls may be expected, with heavy rain when the arch is overhead.

Where the mountains lie near the coast, squalls frequently blow off the land, especially at night when the land breeze is blowing.

The following places have been noted as being particularly subject to squalls :—

(1) The lower reaches of the Kapuas rivieren (about *Lat. 0°*) on the west coast of Borneo, which are subject to fierce squalls.

(2) The northern side of Secam island in North Balabac strait (*Lat. 8° 10′ N., Long. 117° 01° E.*), where squalls often succeed each other in rapid succession and are sometimes very violent.

(3) Bacuit, near the northern end of the western coast of Palawan, where, in heavy weather, variable squalls from the hills, of hurricane strength, occur.

(4) Paluan bay, on the west coast of Mindoro (*Lat. 13° 25′ N., Long. 120° 28′ E.*), where violent squalls sometimes come suddenly from the high land, and at night give no warning.

(5) The channel between the south-western coast of Luzon and the Lubang islands, which is subject at times to heavy off-shore squalls, especially between the hours of 0400 and 1000.

(6) Lingayen gulf, where squalls often blow down from the mountains, especially from Mounts Santo Tomas and San Isidro.

Typhoons.—The name " typhoon," which is of Chinese origin and means " strong wind," is given to the tropical revolving storms of the western part of the North Pacific and the China and Yellow seas. They are also sometimes called " Baguios " in the Philippines, but the name is not used in official weather messages, or in warnings to shipping.

Typhoons are similar to the tropical revolving storms of other parts of the world (*see* standard article, page xxxvi) and are the outstanding meteorological danger to shipping in these waters.

The mean wind velocity that may be expected, during the period when a fully developed typhoon is most active, is about 70 or 80 knots, but it is probable that over the open sea speeds approaching 150 knots may sometimes occur.

It is difficult to give statistics about the frequency of severe typhoons at sea, since ships try to avoid the vicinity of the centre. M. Selga has, however, given the tracks of typhoons in which pressure at the centre has been below 993 mb., and which have reached or approached the Philippines north of lat. 5° N., between 1903 and 1934. The following figures refer only to those storms whose centres entered the region covered by this Pilot, or approached to within 200 miles of it. The mean latitudes are those at which the centres first approached within 200 miles. In most months the range of variation of this lati-

Digitized by Google

Chart 1263.

tude was 7° or 8°. Nearly all the storms left the region in a latitude higher than that in which they approached it.

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
Total number	3	0	0	3	4	11	13	16	22	22	17	8	119
Mean latitude	12°	–	–	11°	13°	15°	17°	18°	17°	15°	13°	13°	14°

These figures show that typhoons in this region were most frequent from June to November, and especially in September and October, and that about four were observed on an average in a year. In individual years, however, the number varied between one and seven. According to some authorities the average number per year is considerably larger, doubtless because many depressions of small intensity were counted as typhoons. It should be remembered, however, that a weak disturbance may rapidly deepen and develop into a typhoon.

The great majority of the typhoons that cross the Philippines originate east of long. 125° E., and move west-north-westward across the islands either to strike the mainland of China or to turn northward before reaching it. A few originate over the China sea and cross the Philippines from west-south-west to east-north-east; in these 32 years this was observed once in May, July and October and three times in August.

Figures 5 and 6 show typhoon tracks for August and December, as charted by Selga.

It is unwise to attribute to a particular typhoon any special track; an examination of the general pressure distribution, especially with regard to anticyclones, will help to give an indication of the probable path which the storm will take. There is no doubt that the positions and movements of the high-pressure areas which lie outside the storm field are connected in some way with the movement of typhoons, but this connection is generally far from simple.

The only rules that it has been found possible to formulate in regard to the movement of typhoons are as follows, and they are not infallible :—

1. Typhoons will avoid a stationary anticyclone by passing round it one way or the other.
2. If an anticyclone advances towards a typhoon the latter will generally either turn away from the advancing high-pressure area or will cease to move.
3. Typhoons like to follow in the wake of a retreating anticyclone; in these circumstances they may move across the isobars.
4. Typhoons tend to move parallel to the isobars which lie outside the radius of the storm itself.

The application of these rules has accounted for the known movement of 75 per cent. of a large number of typhoons the tracks of which have been studied, but they failed to a varying extent in 25 per cent. of cases.

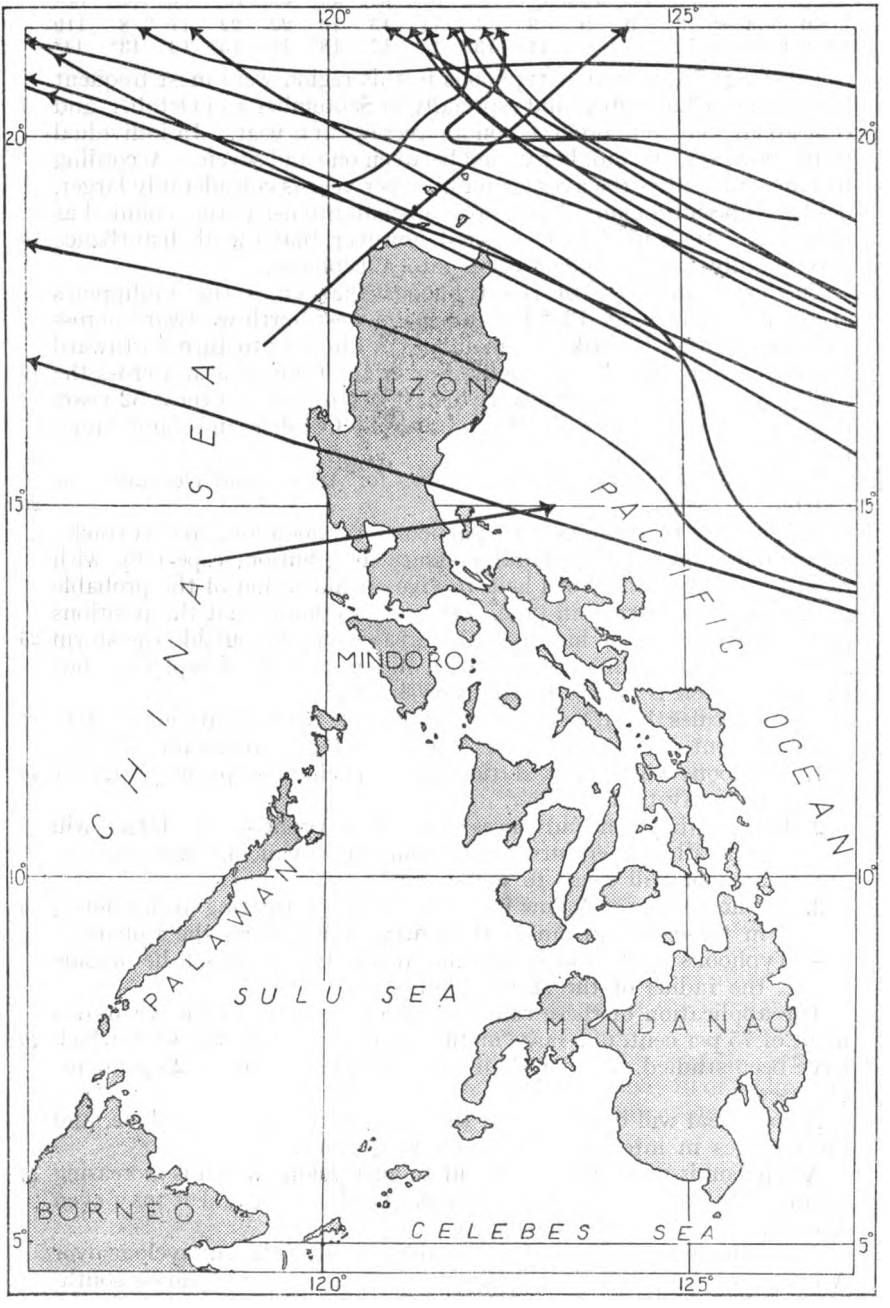
A good deal will depend upon the intensity of the anticyclone, and the changes in intensity that are taking place.

A typhoon is more likely to avoid an anticyclone which is increasing in intensity than one that is undergoing a decrease, and it may even elect to move towards the latter.

As an illustration of Rule 1 the establishment of the anticyclone over Asia in the winter months tends to force the tracks of typhoons southward and eastward; as the anticyclone weakens and disappears in the spring and summer the tracks go farther westward and northward. This anticyclone, however, undergoes large short-period fluctuations in intensity and position, and these, when they occur, often cause

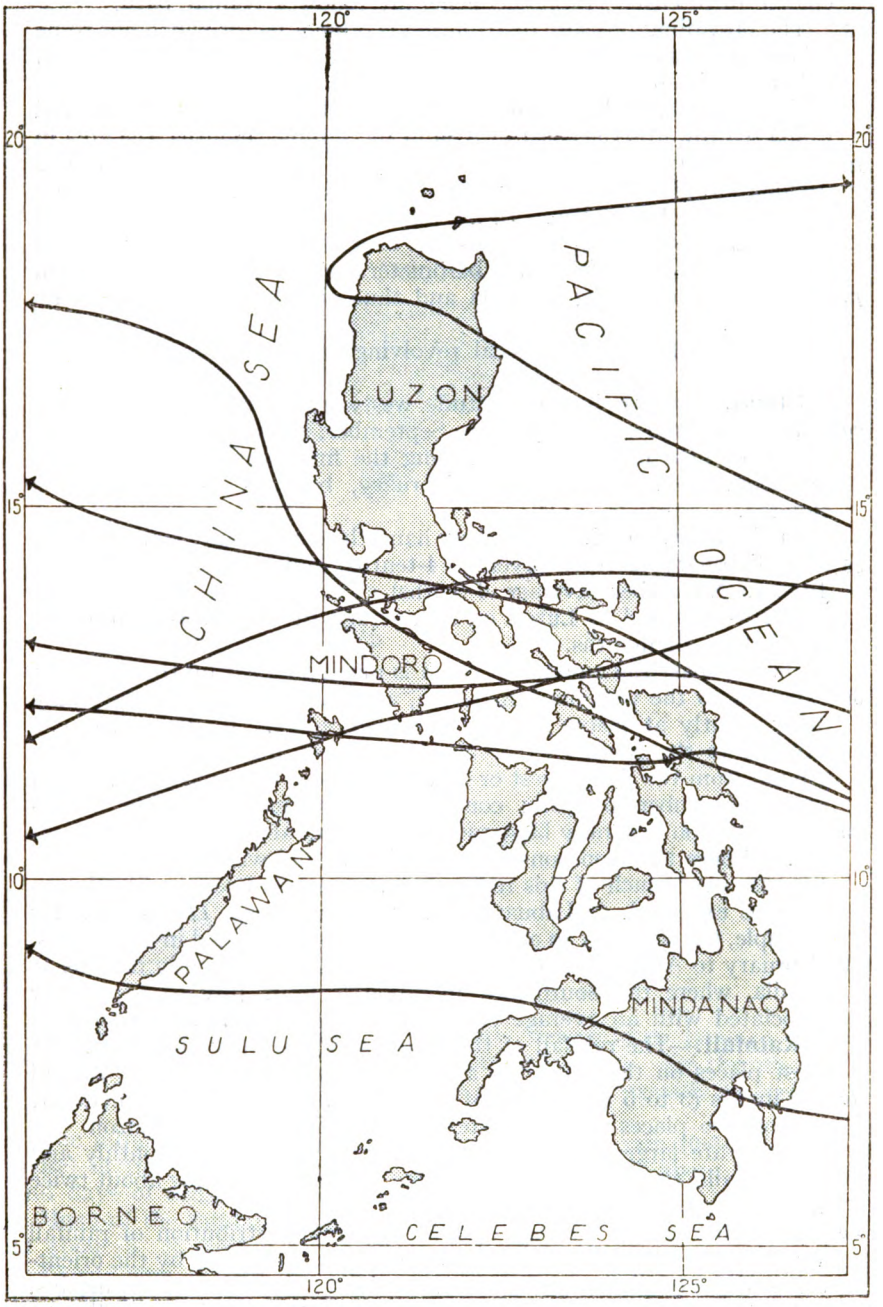
Digitized by Google

Fig. 5. TYPHOON TRACKS IN AUGUST, 1903–34



Digitized by Google

Fig. 6. TYPHOON TRACKS IN DECEMBER, 1903–34



Digitized by Google

Chart 1263.

irregularities in the path of an existing typhoon. In periods during which the high pressure area is stationary and not undergoing any great change in intensity, typhoons generally follow a regular path.

The prevailing pressure distribution is often a factor which has to be taken into account when estimating the distance at which a typhoon will make itself felt.

For example, in the typhoons which cross the Philippine islands and China sea towards the coast of Asia in the summer months, the area in front of the typhoon over which the winds are strong and there is a decided fall of the barometer is frequently not large. This is because pressure over Asia is low. In the autumn, however, when the Asiatic anticyclone is forming and pressure over the land is higher, strong winds and a decided fall of the barometer occur at a greater distance in front of an advancing typhoon and thus give longer warning of its approach.

For the effect of a tropical revolving storm on the current, *see* page 15.

Cloud.—At sea, in low latitude westward of Borneo, during the southerly monsoon, from June to September, the sky is on an average about 5-tenths clouded, and, during the first part of the northerly monsoon, from November to February, between 6- and 7-tenths clouded.

In about lat. 10° N. on the other hand the least cloudy time at sea is from February to April (average 4-tenths) and the cloudiest time is June to November (average 6-tenths).

North-westward of Luzon on an average the sky is 5- to 6-tenths clouded in all months.

On the coast the amount of cloud is much affected by the degree of exposure to the prevailing monsoon, and the seasonal variation may differ greatly at places no great distance apart. In general, coasts exposed to the North-east or North monsoon and sheltered by high ground from the South-west or South monsoon, have most cloud from about November to April; conversely, coasts exposed to the South-west monsoon generally have most cloud from about June to September. Where the monsoons blow nearly parallel with the coast, as is the case over much of this region, no very marked seasonal variation is to be expected, at Labuan (*Lat. 5° 15′ N., Long. 115° 15′ E.*) for example, the sky is on an average about 6-tenths clouded in all months. February to April (with 4- to 5-tenths) are the least cloudy months at Manila, where the South-west monsoon is from July to September associated with an average cloudiness of between 7- and 8-tenths.

Rainfall.—The rainfall of the whole region is very abundant. At most places on the coast the average annual fall is between 75 and 130 inches (3 to 5 times that of England), but is about 150 inches at one or two places on the western coasts of Borneo and Luzon.

There are large differences from year to year in the monthly and annual falls, the rainfall of some of the wettest years being about twice that of the driest.

Both the annual average and the seasonal distribution of rainfall vary greatly from place to place, being much influenced by the orientation of the coast-line and the distribution of the hills and mountains.

On the west coast of Borneo, October to January is generally the wettest time, and the average fall for the wettest month is as a rule between 16 and 24 inches.

On the north-west coast of Borneo the transitional periods between

Digitized by Google

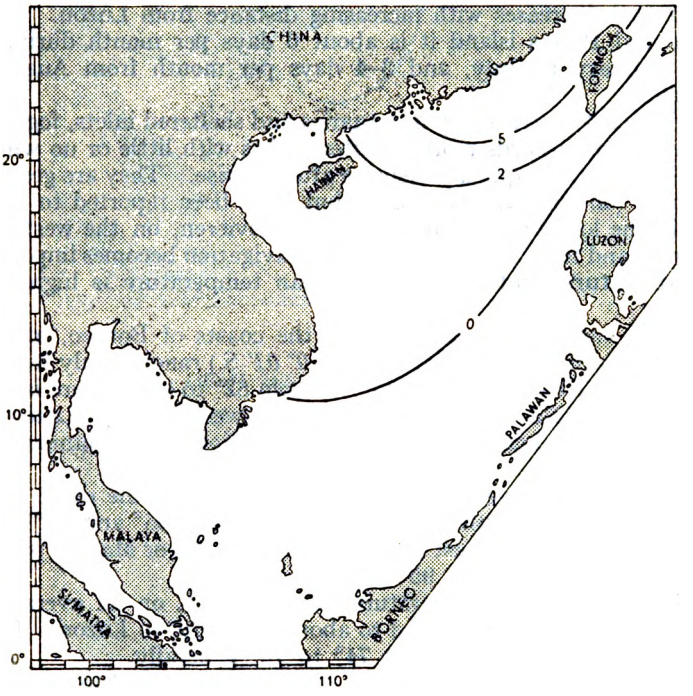
Chart 1263.

the monsoons (about May or June and October) are in many places the wettest times ; north of Brunei bay February and March are the least rainy months, with a monthly average of about 3 inches at Jesselton.

On the west coast of Palawan, at least in the southern part, the seasonal variation is probably similar to that of the coast of Borneo north of Brunei bay.

On the western coasts of Mindoro and Luzon the wettest time is generally from July to September, and the driest from January to April (in some instances November to April). Owing to the high degree of sheltering from the North-east monsoon, these coasts show a closer approach to a genuine dry season than any other part of the

Fig. 7. PERCENTAGE FREQUENCY OF FOG—APRIL



region covered by this Pilot, the monthly means from January to March being in several cases a quarter of an inch or less. On the other hand from July to September monthly averages are usually as large as 20 or even 30 inches.

The number of days per month with appreciable rain (0·04 in. or more) in the wettest months at the wettest places is about 20–25, and days of considerable rain about 12–16.

Much of the rainfall is associated with thunderstorms except north of about 5° N. during the North-east monsoon.

Exceptional downpours usually result from a typhoon, and the irregular appearances of these storms is partly responsible for the large variations of rainfall from year to year.

Fog and visibility.—(*See* Figure 7.) At sea, fog is very infrequent over most of the region, but north of about lat. 10° N., between January

Digitized by Google

Chart 1263.

and March, it may be encountered on about one day in 2 months; around Pratas island (*Lat. 20° 42′ N., Long. 116° 43′ E.*) a similar frequency is usual from January to April. Occasionally exceptional downpours of rain may reduce visibility to less than half a mile, although generally only for a few minutes at a time.

From August to October visibility is less than 5 miles on as many as 6–10 days per month off the west and north-west coasts of Borneo. This is due to the fact that the dust haze that is so frequent in these months to the west and north-west of Australia is carried across the Java sea by the South-east trade-wind, and then northward by the southerly monsoon off the west coast of Borneo. In November the onset of the northerly monsoon causes hazy days to become infrequent.

Farther north visibility at sea is less than 5 miles on about 1–3 days per month, except to the north-westward of Luzon, where the number of such days increases with increasing distance from Luzon. In the seas around Pratas island it is about 6 days per month during the period January to July, and 3–4 days per month from August to December.

On the coast, particularly in estuaries and sheltered inlets, fog sometimes develops towards morning after nights with little or no wind or cloud, but such fogs quickly disperse after sunrise. They are generally infrequent (one or two per month) but have been reported to be frequent in the lower reaches of the Kapuas rivieren, on the west coast of Borneo, and to be so dense there that navigation becomes impossible.

Temperature and humidity.—Mean temperature is high in all seasons.

Seasonal variation is negligible on the coasts of Borneo, monthly mean temperatures at Pontianak (*Lat. 0° 01′ S.*) ranging only from 79° to 81°, and at Labuan (*Lat. 5° 15′ N.*) from 82° to 83°; there is, however, an appreciable seasonal effect on the west coast of Luzon, the monthly mean at Laoag (*Lat. 18° 12′ N.*) being 77° in January and 84° in May.

In January, the average temperature reached on the coast during the day varies little with latitude, being between 85° and 89° nearly everywhere. In the hottest month (as a rule April or May) it is about 90° in Borneo and 90° to 95° in Luzon.

In January coastal temperature falls at night, on an average, to about 70° to 74° in Borneo, and to about 68° to 70° in Luzon. In the hottest month it falls to about 74° to 76° generally.

The highest coastal temperatures likely to be reached in a year are about 93° to 95° in Borneo and 96° to 100° in Luzon. In Luzon temperature on very rare occasions rises to between 100° and 104°.

Humidity is high in all seasons on the coasts of Borneo, averaging between 80 and 85 per cent., the damp and heat combining to make the climate oppressive and enervating, while the nights bring little relief owing to the high temperatures then prevalent.

On the coast of Luzon a similar state of affairs exists from June to December, but from January to May mean relative humidity is below 80 per cent., and at Manila drops to about 70 per cent. in March and April.

At sea in January the mean air temperature and the mean temperature of the surface water are between 81° and 82° westward of Borneo, and 80° to 81° north-westward of Borneo and Palawan; both fall with further increase of latitude to about 76° off Cape Bojeador, in northern Luzon. In May mean air temperature is between 82° and 84°, and

Digitized by Google

Fig. 8. MEAN SEA SURFACE TEMPERATURE—FEBRUARY

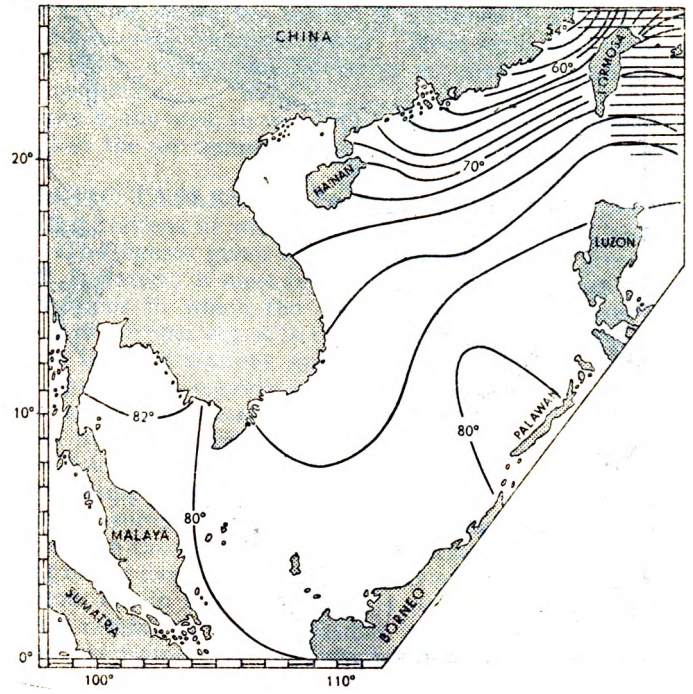
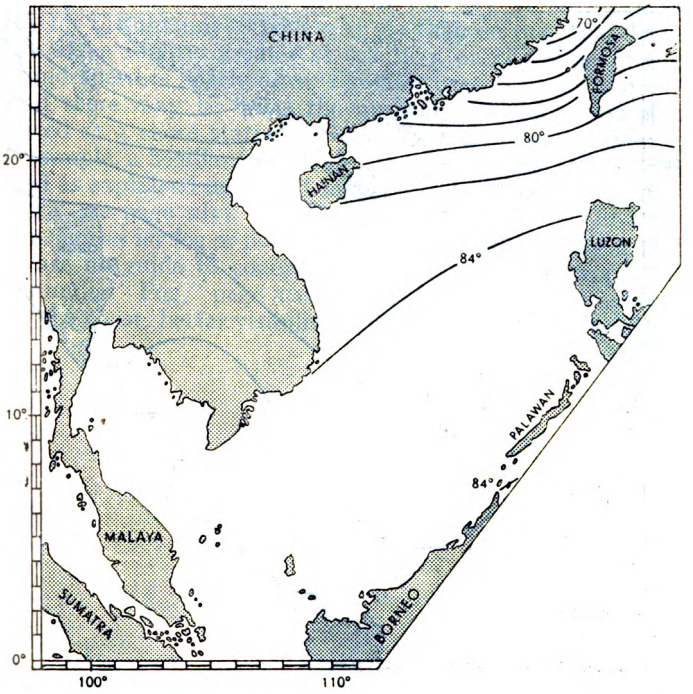


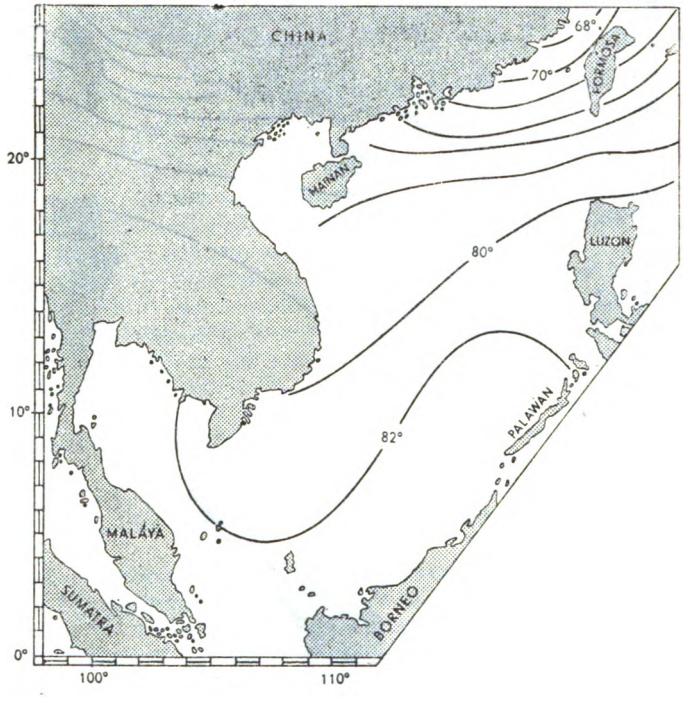
Fig. 9. MEAN SEA SURFACE TEMPERATURE—MAY



Digitized by Google

Fig. 10. MEAN SEA SURFACE TEMPERATURE—AUGUST

Fig. 11. MEAN SEA SURFACE TEMPERATURE—NOVEMBER



Digitized by Google

Chart 1263.

mean sea surface temperature about 84° throughout the whole region. The temperature of the sea surface is occasionally 2° or 3° above or below the average for the time of year. Mean sea surface isotherms for February, May, August and November are given in Figures 8, 9, 10 and 11, respectively.

In Figure 8, the area, in which the sea temperature is more than 3° greater than the air temperature, is shown by horizontal shading.

CLIMATIC TABLES.—The tables that follow give statistics for several land stations at which there is a regularly reporting weather station. The figures given are averages, percentage frequencies or extremes, as stated; it must be realized that these values refer to the actual positions in which the weather has been observed and *not* necessarily to the open sea or to the approaches to ports in the vicinity. The tables for land stations should therefore be consulted with discretion, especially as regards wind, visibility, cloud, temperature and humidity, since all these elements are probably affected, sometimes a great deal, by local conditions. The following notes indicate ways in which conditions in the open sea may be different from those at the nearest reporting station for which a table is published.

(1) Temperatures over the sea are less extreme, or show smaller departures from the mean, than those over the land. In the night and early part of the day, it is usually warmer over the sea than that at a land station, but in the afternoon it is generally cooler over the sea.

(2) Since rainfall at coastal stations in this region is often largely orographic, the figures given are not representative of rainfall at sea in the vicinity. In general, rainfall is smaller at sea than on the coast, especially on the west coast of Luzon during the South-west monsoon.

(3) Cloud amount, which in this region is very variable, is only broadly representative of the state of the sky at sea. There is a tendency for the amount to be less at sea than on the coast during the day, but to be slightly greater at sea than on the coast at night.

(4) Wind speed is nearly always greater over the sea than over the land, and there may be twice the number of gales at sea than are experienced at a shore station unless it is exceptionally well-exposed on, for example, a headland or small low-lying island. Wind direction is affected as explained under " Local modification of the weather near the coast," *see* page xlvi.

(5) The figures for fog or poor visibility at inland stations or sheltered harbour are no guide to conditions at sea and in the approaches to ports (*see* under " Fog," page xlvii). On the rare occasions when there is fog on the coast, better visibility will nearly always be found at sea.

Digitized by Google

PLACE—PONTIANAK. LAT. 0° 01′ S., LONG. 109° 20′ E. Height above Mean Sea Level, 9 feet (2m7).

Climatic table compiled from 1 to 63 Years' Observations, 1879 to 1948.

MONTH	PRESSURE at M.S.L.	AIR TEMPERATURE Mean of				Relative humidity		SKY No. of days		RAIN		WIND DIRECTION																Mean wind force or speed		No. of days with gale	No. of days with fog or mist
												From 0630 to 1130									From 1230 to 1730											
												Percentage of observations from									Percentage of observations from											
	Mean	Daily max.	Daily min.	Highest in each month	Lowest in each month	0600	1200	Clear	Cloudy	Average fall	No. of days with Trace or more	N.	NE.	E.	SE.	S.	SW.	W.	NW.	Calm	N.	NE.	E.	SE.	S.	SW.	W.	NW.	Calm	0630 to 1130	1230 to 1730		
	mb.	°F.	°F.	°F.	°F.	%	%			in.																			Beaufort			
January	1010	87	74	91	72	93	67	—	—	10·9	16	7	16	46	16	5	0	3	3	4	10	8	17	9	10	10	26	9	1	1·5	2·2	—	—
February	1010	89	76	93	72	93	65	—	—	8·2	13	3	2	17	8	2	2	0	1	65	3	1	31	3	4	8	14	5	31	1·2	2·1	—	—
March	1009	89	75	93	72	93	64	—	—	9·5	14	4	2	40	6	1	0	1	2	44	6	2	21	0	2	5	31	8	25	1·1	1·8	—	—
April	1009	89	75	93	73	93	66	—	—	10·9	16	3	3	22	1	0	1	1	0	69	6	2	14	0	1	5	31	9	33	1·0	1·6	—	—
May	1009	90	75	94	73	94	66	—	—	11·1	15	2	6	24	8	0	3	1	0	56	6	14	26	10	2	8	8	0	26	1·7	1·4	—	—
June	1009	90	75	93	73	93	66	—	—	8·7	13	0	0	28	19	29	10	4	0	10	0	0	31	3	22	25	19	0	0	1·9	2·9	—	—
July	1009	89	74	93	71	93	63	—	—	6·5	10	0	1	44	16	31	7	1	0	0	0	8	36	23	21	8	4	0	0	2·1	2·3	—	—
August	1009	90	74	93	71	93	62	—	—	8·0	13	0	0	13	9	61	0	0	0	17	0	0	11	8	40	37	4	0	0	1·6	2·5	—	—
September	1009	90	75	93	72	93	63	—	—	9·0	13	0	0	6	66	12	12	4	0	0	0	0	6	44	19	23	5	3	0	1·8	2·7	—	—
October	1010	89	75	92	73	93	65	—	—	14·4	19	4	3	24	51	11	2	4	1	0	6	3	10	29	19	15	16	2	0	2·0	2·6	—	—
November	1010	88	75	92	73	93	68	—	—	15·3	20	4	7	7	23	4	14	34	4	1	3	0	1	2	0	11	77	6	0	2·0	2·6	—	—
December	1009	87	75	91	73	93	69	—	—	12·7	19	4	29	28	2	0	3	8	9	7	11	9	2	0	0	10	44	24	0	1·8	2·7	—	—
Means	1009	89	75	93*	72**	93	65	—	—	—	—	3	6	25	19	13	4	5	2	23	4	4	17	11	12	14	23	5	10	1·7	2·7	—	—
Totals	—	—	—	—	—	—	—	—	—	125·0	181	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—		—	—	—	—
Extreme values	—	—	—	96†	68††	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—		—	—	—	—
No. of years' observations	27	20	20	20	20	20	20	—	—	63	44	1																		1	1	—	—

* Mean of highest each year.
** Mean of lowest each year.

† Highest recorded temperature.
†† Lowest recorded temperature.

Authorities:—MS. data supplied by Meteorological and Geophysical Service, Batavia.

METEOROLOGICAL OFFICE,
AIR MINISTRY.

Digitized by Google

PLACE—LABUAN. LAT. 5° 17′ N., LONG. 115° 16′ E. Height above Mean Sea Level, 58 feet (17m7).
Climatic table compiled from 3 to 28 Years' Observations, 1912 to 1941.

MONTH	PRESSURE at M.S.L.	AIR TEMPERATURE Mean of				Relative humidity		SKY No. of days		RAIN		WIND DIRECTION																Mean wind force or speed		No. of days with wind of 34 knots or more	No. of days with visibility less than ½ nautical mile
												0700									1300										
	Mean of 24 hours	Daily max.	Daily min.	Highest in each month	Lowest in each month	0700	1300	Clear less than 1/10	Cloudy more than 9/10	Average fall	No. of days with 0·01 in. or more	Percentage of observations from									Percentage of observations from									0700	1300		
												N.	NE.	E.	SE.	S.	SW.	W.	NW.	Calm	N.	NE.	E.	SE.	S.	SW.	W.	NW.	Calm				
	mb	°F.	°F.	°F.	°F.	%	%			in.																			Beaufort			
January	1010	85	75	89	71	88	73	0	14	7·5	10	3	29	16	7	13	3	0	0	29	60	12	0	7	7	7	0	0	7	1	3	0	0
February	1011	86	75	89	71	88	72	2	9	5·3	8	7	18	11	7	14	4	0	0	39	54	18	0	0	10	10	4	0	4	1	3	0	0
March	1010	87	76	91	72	89	72	1	5	6·1	10	3	7	10	10	20	11	0	0	39	29	16	3	3	16	16	7	7	3	1	2	0	0
April	1009	89	76	92	72	87	71	1	4	9·2	14	0	7	14	10	23	10	3	0	33	30	10	0	7	20	13	10	7	3	1	2	0	0
May	1009	88	76	91	72	87	72	0	10	12·6	17	0	0	7	13	35	19	3	0	23	9	9	3	3	20	22	20	7	7	1	2	0	0
June	1009	88	75	91	72	86	69	1	9	12·5	15	0	3	3	10	34	24	3	3	20	10	3	3	7	27	27	10	3	10	1	2	0	0
July	1010	88	76	91	71	86	69	2	11	9·7	12	0	0	3	7	48	26	3	0	13	3	0	0	7	32	35	13	3	7	2	2	0	0
August	1009	88	75	91	71	85	69	0	16	10·4	15	0	0	3	3	42	32	7	0	13	0	0	0	3	22	39	22	7	7	2	2	0	0
September	1010	88	75	91	71	86	70	0	13	15·3	14	0	0	0	10	43	27	3	0	17	10	7	0	3	26	20	20	7	7	2	2	0	0
October	1011	87	75	91	71	87	72	1	11	16·2	20	0	0	3	10	42	22	7	3	13	16	7	0	3	13	32	26	3	0	2	2	0	0
November	1009	87	75	90	71	86	71	1	5	15·1	19	0	0	10	10	33	27	3	0	17	13	10	3	3	10	26	19	10	6	1	2	0	0
December	1010	86	75	90	71	88	75	0	15	13·3	16	3	13	13	10	26	19	0	0	16	32	10	0	0	16	20	13	3	6	2	2	0	0
Means	1010	87	75	—	—	87	71	—	—	—	—	1	6	8	9	31	18	3	1	23	22	9	1	4	18	22	14	5	5	1	2	—	—
Totals	—	—	—	—	—	—	—	9	122	133·2	170	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0	0
Extreme values	—	—	—	94†	66††	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
No. of years' observations	3	10	10	10	10	3	3	3	3	28	12	3																		3	3	3	3

Standard of time—115° E.

† Highest recorded temperature.

†† Lowest recorded temperature.

Authorities:—MS. data supplied by Malayan Meteorological Service.

METEOROLOGICAL OFFICE,
AIR MINISTRY.

Digitized by Google

PLACE—MANILA. LAT. 14° 35′ N., LONG. 120° 59′ E. Height above Mean Sea Level, 47 feet (14m3).
Climatic table compiled from 3 to 75 Years' Observations.

MONTH	PRESSURE at M.S.L.	AIR TEMPERATURE Mean of				Relative humidity		SKY No. of days		RAIN		WIND DIRECTION																Mean wind force or speed		No. of days with wind force 8 or more	No. of days with fog or mist
												0600									1300										
												Percentage of observations from									Percentage of observations from										
	Mean of 24 hrs.	Daily max.	Daily min.	Highest in each month	Lowest in each month	0600	1300	Clear ⅛ or less	Cloudy ⅞ or more	Average fall	No. of days with 0·04 in. or more	N.	NE.	E.	SE.	S.	SW.	W.	NW.	Calm	N.	NE.	E.	SE.	S.	SW.	W.	NW.	Calm	0600	1300		
	mb.	°F.	°F.	°F.	°F.	%	%			in.																			knots			
January	1013	86	69	91	63	89	63	4	9	0·9	3	26	34	13	3	0	0	1	3	20	7	13	10	7	3	26	29	4	1	2	5	0	—
February	1013	88	69	92	63	88	59	5	5	0·5	2	18	32	19	4	1	0	0	3	23	3	4	7	12	2	25	43	4	0	1	6	0	—
March	1012	91	71	95	64	85	55	6	3	0·7	2	12	32	23	6	1	0	0	1	25	1	4	10	20	4	22	36	2	1	1	6	0	—
April	1010	93	73	97	67	85	55	3	5	1·3	2	6	28	29	8	0	0	0	1	28	3	4	10	25	4	17	33	4	0	1	6	0	—
May	1009	93	75	97	70	88	61	1	4	5·1	11	10	24	26	13	2	3	1	0	21	1	3	7	21	4	29	31	4	0	2	7	0·1	—
June	1008	91	75	96	72	91	68	0	11	10·0	16	5	20	29	17	3	6	2	0	18	0	2	3	13	5	37	36	3	1	2	6	0·4	—
July	1007	88	75	93	72	91	74	0	21	17·0	22	5	14	24	13	9	16	5	2	12	1	3	2	6	5	49	27	5	2	3	8	0·8	—
August	1007	87	75	92	72	92	73	0	23	16·6	20	6	15	22	14	5	14	10	1	13	1	1	1	4	3	52	35	2	1	3	7	0·5	—
September	1008	88	75	92	72	93	73	0	22	14·0	19	8	21	22	14	5	9	3	3	15	3	1	3	4	6	38	40	5	0	2	6	0·9	—
October	1009	88	74	92	70	92	71	0	17	7·6	15	12	33	22	8	3	5	3	1	13	5	6	5	6	4	31	34	8	1	2	5	0·5	—
November	1010	87	72	92	67	91	69	1	12	5·7	10	22	37	17	5	1	1	1	4	12	8	17	7	9	4	22	26	6	1	2	5	0·1	—
December	1011	86	70	91	65	90	67	3	11	2·6	5	25	33	14	3	1	0	0	4	20	7	19	9	7	4	22	26	5	1	2	5	0	—
Means	1010	89	73	98*	61**	90	66	—	—	—	—	13	27	22	9	3	4	2	2	18	3	7	6	11	4	31	33	4	1	2	6	—	—
Totals	—	—	—	—	—	—	—	23	143	82·0	127	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	3	—
Extreme values	—	—	—	101†	58††	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
No. of years' observations	56	56	56	16	16	10	10	3	3	75	9	10																		10	10	41	—

Standard of time—120° E.

* Mean of highest each year.
** Mean of lowest each year.

† Highest recorded temperature } in 49 years.
†† Lowest recorded temperature }

Authorities:—MS. data supplied by Weather Bureau, Manila.

METEOROLOGICAL OFFICE,
AIR MINISTRY.

Digitized by Google

PLACE—VIGAN. LAT. 17° 34′ N., LONG. 120° 23′ E. Height above Mean Sea Level, 40 feet (12m2).

Climatic table compiled from 10 to 44 Years' Observations, 1887 to 1937.

MONTH	PRESSURE at M.S.L.	AIR TEMPERATURE Mean of				Relative humidity		SKY No. of days		RAIN		WIND DIRECTION																Mean wind speed		No. of days with gale	No. of days with fog or mist
												0600									1400										
												Percentage of observations from									Percentage of observations from										
	Mean of day	Daily max.	Daily min.	Highest in each month	Lowest in each month	0600	1400	Clear less than 1/10	Cloudy more than 8/10	Average fall	No. of days with 0·04 in. or more	N.	NE.	E.	SE.	S.	SW.	W.	NW.	Calm	N.	NE.	E.	SE.	S.	SW.	W.	NW.	Calm	0000 to 0600	1200 to 1800		
	mb.	° F.	° F.	° F.	° F.	%	%			in.																			knots			
January	1012	86	71	90	65	78	60	11	2	0·1	0·6	20	9	14	8	6	5	6	18	14	15	3	3	0	0	4	28	47	0	3	8	—	—
February	1012	86	71	90	66	79	60	9	1	0·2	0·4	17	7	15	11	7	7	5	17	14	11	1	1	0	0	7	34	46	0	3	9	—	—
March	1011	89	74	92	68	79	60	11	0·3	0·3	0·4	12	7	15	13	8	7	6	13	19	9	0	0	0	0	8	39	44	0	3	9	—	—
April	1009	91	76	94	72	79	60	10	0·4	0·6	2	7	3	11	19	9	7	9	11	24	4	0	0	0	0	12	47	37	0	2	8	—	—
May	1008	91	77	94	74	84	66	4	6	7·7	12	4	4	16	26	20	13	3	5	9	2	0	0	0	3	29	44	22	0	3	7	—	—
June	1007	89	77	93	73	88	71	1	9	13·5	17	2	1	10	23	29	23	6	2	4	0	0	0	0	9	42	36	12	1	3	6	—	—
July	1006	88	76	91	73	90	76	0·6	16	28·3	22	3	1	5	19	26	32	5	5	4	2	0	0	0	14	41	32	11	0	4	7	—	—
August	1006	87	76	91	73	90	76	1	15	27·6	20	1	1	6	17	30	29	6	2	8	2	0	0	0	14	47	25	12	0	4	7	—	—
September	1007	88	76	91	73	91	74	0·8	11	17·7	15	5	3	10	22	17	20	4	7	12	5	1	0	0	8	32	32	22	0	3	6	—	—
October	1008	88	75	92	70	87	69	4	7	5·9	7	17	5	9	16	12	11	6	14	10	21	3	0	0	1	9	28	37	0	3	7	—	—
November	1010	88	73	93	68	84	66	7	5	1·5	3	23	9	10	10	5	7	5	20	11	25	4	2	1	1	5	20	41	1	3	7	—	—
December	1011	86	72	91	66	83	64	11	3	0·4	1	20	11	11	8	3	5	7	20	15	20	5	3	0	1	4	26	41	0	3	7	—	—
Means	1009	88	75	95*	63**	84	67	70	76	—	—	11	5	11	16	14	14	6	11	12	10	1	1	0	4	20	33	31	0	3	7	—	—
Totals	—	—	—	—	—	—	—	—	—	103·8	100	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Extreme values	—	—	—	97†	57††	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
No. of years' observations	34-35	18	18	10	10	10	10	10	10	40-44	10	10																		10	10	—	—

Standard of time—120° E.

* Mean of highest each year.
** Mean of lowest each year.

† Highest recorded temperature.
†† Lowest recorded temperature.

Authorities:—Annual Report of the Weather Bureau, Manila.

METEOROLOGICAL OFFICE,
AIR MINISTRY.

Digitized by Google

CHAPTER II

ISLANDS AND DANGERS BETWEEN SINGAPORE STRAIT AND BORNEO

Chart 2660a.

TUDJUH EILANDEN.—Under the general name of Tudjuh (Tuju) eilanden are comprised all those islands belonging to the Oost-Indische archipel, which lie in the southern portion of the China sea, northward of the equator. They consist of four groups known as the Badas, Tambelan, Natuna and Anambas eilanden.

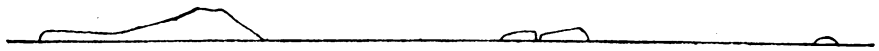
The best time to visit these islands is at the change of the monsoons, the spring being preferable. During the monsoons many of the islands are inaccessible on account of heavy surf, and the probability of favourable weather is small.

Anambas eilanden are described in China Sea Pilot, Vol. I.

Currents.—Tidal streams.—H.M. Surveying ship *Rifleman*, when surveying in the neighbourhood of these islands in fine weather with generally light winds, in 1862, observed that during the South-west monsoon period, from the middle of July to the middle of September, and also during the North-east monsoon period, in December, the tidal stream set to windward, against the prevailing monsoon drift, for an uncertain portion of each day.

Climate and weather.—*See* page 22.

BADAS EILANDEN.—Dangers.—Badas eilanden are situated outside the usual track of shipping between the parallels of 0° 30′ N. and 0° 39′ N., and the meridians of 106° 58′ E. and 107° 12′ E.; the easternmost of the group lies about 100 miles westward of Tanjong Batu Belat, the western extremity of Borneo; they are of little importance to shipping. The group consists of a number of hilly islands and rocks separated by deep channels; they are sparsely populated and the inhabitants are principally employed in fishing and coconut cultivation.



Badas eilanden.

(*Original dated* 1914.)

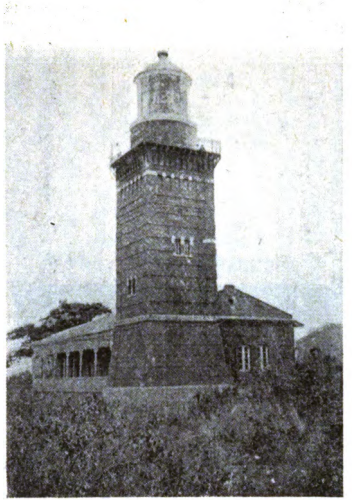
Owing to the small scale of the chart it is only possible to give a description of the principal islands and dangers, and vessels without local knowledge should not attempt to pass between them.

Chart 1263.

Digitized by Google

To face page 42.

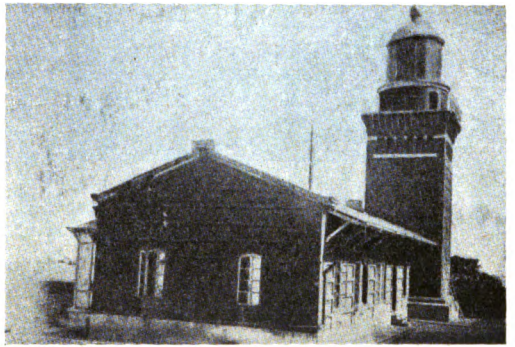
Cape Melville lighthouse.
(*Original dated* 1909.)



Cabra lighthouse.
(*Tower and dwelling painted white.*)
(*Original dated* 1909.)

Cape Santiago lighthouse,
bearing about 090°, half a mile.
(*Original dated* 1908.)

Sueste point lighthouse.
(*Original dated* 1909.)



Capon Grande lighthouse.
(*White tower.*)
(*Original dated* 1909.)

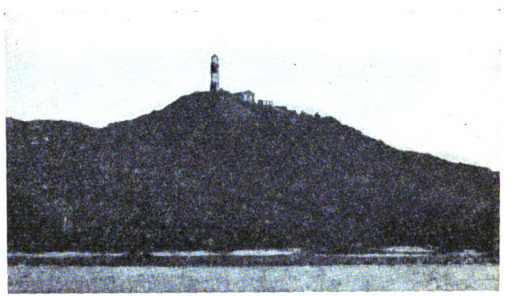
Palauig point lighthouse.
(*Original dated* 1909.)

Digitized by Google

To face page 43.

San Fernando point lighthouse
from westward.
(*White tower.*)
(*Original dated* 1909.)

Cape Bolinao lighthouse.
(*Original dated* 1909.)



Cape Bojeador lighthouse
from south-westward.
(*White tower.*)
(*Original dated* 1909.)

Digitized by Google

Chart 2660a.

Anak Awur (*Lat. 0° 33′ N., Long. 106° 59′ E.*), the south-western island of the group, is 310 feet (94m5) high and rugged except on its south-western side, which is sandy; it is fringed by a narrow reef except on its eastern side.

Pedjamu (Pejamu), 138 feet (42m1) high and densely wooded, lies 10 miles east-south-eastward of Anak Awur. On the eastern side of the island there is a sandy beach. A white rock lies near the extremity of a reef which extends about 3 cables north-north-eastward from the island. A bank, with a least depth of 7¾ fathoms (14m2) over it, lies about 2 miles east-south-eastward of Pedjamu.

Pinang Seribu, 404 feet (123m1) high, lies about 2½ miles northward of Anak Awur; when seen from a distance south-south-eastward or north-north-westward it appears as two islands, there being a depression between the hills which lie on its eastern and western sides. The island is fringed by a reef which extends about 6 cables northward, from it; Tokong Kangen, a steep conical rock, 128 feet (39m0) high, lies near the northern end of the reef. Tokong Buton, a small islet, 82 feet (25m0) high, lies about 2½ cables southward of Pinang Seribu, from which it is separated by a deep channel.

Pinang Seratus is a high rock situated about 3 cables north-eastward of the eastern extremity of Pinang Seribu; it lies near the southern end of a reef, with depths of about one foot (0m3) over it, which extends about 4 cables northward; there is also a rock above water about 1¼ cables northward of Pinang Seratus. Between this reef and the reef extending from Pinang Seribu there is a narrow deep channel.

Kepahiang (*Lat. 0° 38′ N., Long. 107° 01′ E.*), the northernmost and largest island of the group, lies 2 miles north-eastward of Pinang Seribu; except on its eastern side the whole island is high, attaining an elevation of 827 feet (252m1) about half a mile from its southern extremity. There is a small bay on the north-eastern side of the island, where small craft with local knowledge can obtain a sheltered anchorage off a small Chinese settlement.

Segun, 144 feet (43m9) high, lies about 8 cables eastward of the southern extremity of Kepahiang. The southern end of Segun is a sandy spit terminating in a rock, 39 feet (11m9) high. The greater part of the island is under coconut cultivation. A reef, with a least depth of 6 feet (2m0) over it, lies about 1¼ miles east-north-eastward of Segun.

Penau, about 3 miles east-south-eastward of Segun, consists of two hills, the eastern of which is 620 feet (189m0) high, joined by a narrow neck of low ground to the western, which is 334 feet (101m8) high. On the northern side of the island between the two hills there is a bay with a sandy beach. This is the residence of the Chief of the so-called Orang Laut who form the population of the Badas eilanden. The population of Penau does not exceed thirty.

Batu is a small islet, 315 feet (96m0) high, and thickly covered with vegetation, situated about 1¼ miles south-eastward of Penau.

Tebon, 2 miles east-south-eastward of Penau is the most important island of the group; it has two hills, the eastern of which rises to an elevation of 590 feet (179m8), joined by low land to the lower western summit. The bay on the northern side of the island has a barrier reef within which is a small basin, in which native craft can find safe anchorage in all weathers. The island has a population of about 120 Orang Laut, who dwell in huts near the northern and southern bays.

Chart 1263.

Digitized by Google

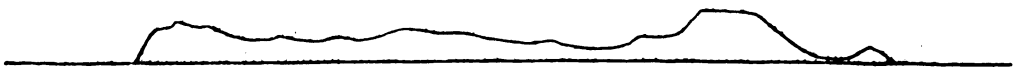
Chart 2660a.

A prominent white rock, 69 feet (21m0) high, lies 4 cables eastward of Tebon, and a shoal, with a least depth of 6½ fathoms (11m9) over it, lies about 2 cables farther eastward.

Brace eilanden consist of a group of three islets: **Pinang Kuning**, the north-westernmost, 387 feet (118m0) high, lies with its southern point, which is low and sandy, about 2¼ miles eastward of Tebon. A large and prominent rock lies on this point. Rocks extend about 2 cables northward from the island; there is a landing place for native craft amongst these rocks. The principal industry is coconut cultivation. A coral shoal, with a least depth of 3¼ fathoms (5m9) over it, lies about half a mile westward of Pinang Kuning. Tanjaru, 6½ cables south-eastward of Pinang Kuning, consists of two hills, of which the western, 374 feet (114m0) high, is the higher; a reef extends about 2 cables northward from the islet. Mengegah, a steep-to islet, 325 feet (99m1) high, lies about 2 cables eastward of Tanjaru.

Islands and dangers southward and eastward of the Badas group.—Ebeling shoal, with a depth of 2 fathoms (3m7) over it, is a steep-to coral patch, one cable in extent, lying 15 miles east-south-eastward of Mengegah, of the Brace eilanden; it is not marked in any way.

Pedjantan (Pejantan), about 23 miles south-south-eastward of Pedjamu, is a hilly island mostly covered with jungle; it is uninhabited. The island consists of a gently undulating tableland rising towards each of its three main extremities to fairly steep hills. The greatest elevation, near the north-eastern point, is a peak, 748 feet (228m0) high. Near the western point is a conical peak, 400 feet (121m9) high, which rises steeply from the sea. Close westward of this point is an islet, 98 feet (29m9) high, with a group of rocks, above water, about one cable outside it. A shoal, with a depth of 11 feet (3m4) over it, lies 3¼ cables south-south-westward of this islet. On the northern side of the island there is a bight, the shores of which are fringed by a reef, on the outer edge of which lies a small islet. A rock, with a depth of 10 feet (3m0) over it, lies about 3 cables northward, and one with a depth of 3 feet (1m0) over it, the same distance westward of the islet.



Pedjantan, bearing 286°, 12 miles.
(*Original dated* 1914.)

Pengiki besar (*Lat. 0° 15′ N., Long. 108° 03′ E.*), situated 47 miles eastward of Pedjantan, is the south-easternmost of the Tudjuh eilanden; it consists of a conical hill, 650 feet (198m1) high, with a small hillock, 249 feet (75m9) high, about 2 cables westward of it.

Pengiki kechil is a rugged precipitous islet, 246 feet (75m0) high, lying about 3¼ cables westward of Pengiki besar, from which it is separated by a deep channel. Both these islands are covered with dense vegetation, and are uninhabited. A coral shoal, with a least depth of 6 fathoms (11m0) over it, lies in the northern entrance to the channel dividing the two islands.

Chart 1263.

Digitized by Google

Chart 2660a.

There is good anchorage for vessels with local knowledge, sheltered from the North-east monsoon, in a depth of about 15 fathoms (27m4), with the southern extremity of Pengiki kechil bearing 274°, and the south-western extremity of Pengiki besar, 338°.

Welstead shoal, lying about 20 miles north-north-westward of Pengiki besar, is steep-to, about 3 cables long and a cable wide, and has a least depth of 2¾ fathoms (5m0) over it; a detached shoal, with a least depth of 6 fathoms (11m0) over it, lies about 2 cables westward of this shoal.

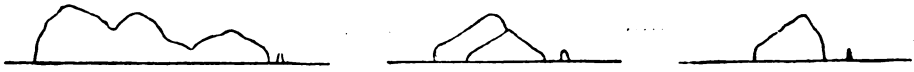
Chart 361.

Rodger rock lies about 21 miles east-north-eastward of Mengegah. This dangerous rock has a least depth of 3 feet (0m9) over it, but the sea never breaks over it.

Djangkulan (Jangkulan), about 13½ miles north-eastward of Mengegah, is a low, densely wooded islet, with a well defined grove of trees near its centre; the coast consists of a white sandy beach; it is fringed by a reef which extends about 1½ cables offshore.

Chart 2660a.

Islands and dangers northward of the Badas group.—Tokong Kemudi lies about 23 miles north-westward of Kepahiang (page 43). It is formed by two hills joined by a thickly wooded ridge; the northern hill rises in a nearly vertical cliff from the sea to an elevation of 576 feet (175m6). The north-eastern side of the island is fringed by a narrow reef, and there are sandy beaches on this and on the south-western side. A sugar-loaf shaped rock, 121 feet (36m9) high, lies on the outer edge of the reef near the south-eastern point of the island. The island is uninhabited but is occasionally visited by the natives of the Tambelans to collect turtles and birds-nests.



Bearing 008°, 7 *miles.* | *Bearing* 332°, 10 *miles.* | *Bearing* 320° 13 *miles.*

Tokong Kemudi.

(*Original dated* 1914.)

Dumdum (*Lat. 1° 12′ N., Long. 106° 54′ E.*), about 18 miles north-north-eastward of Tokong Kemudi, is a densely wooded island rising steeply from the sea to two peaks, the northern and more pointed of which is 625 feet (190m5) high. There is a sandy beach on the southern side of the island.

Chart 361.

Tokong Uwi, about 19 miles eastward of Dumdum, consists of two large and two small, bare, precipitous rocks lying on a steep-to reef, on which there is a least depth of 2¾ fathoms (5m0). The northern of the two larger rocks is 113 feet (34m4) high, and the southern 93 feet (28m3) high.

Chart 2660a.

Mendarik, about 11½ miles north-eastward of Dumdum, is formed by two hills joined by a lower ridge; the southern hill is the higher and rises to an elevation of 364 feet (111m0). Over the north-eastern point of the island is a small isolated peak. The coasts of this island are

Chart 1263.

Digitized by Google

Chart 2660a.

steep and rugged, except for some sandy beaches on its eastern and western sides; the eastern side of the island is fringed by a narrow reef.

Pengibu eilanden.—Kaju (Kayu) Ara, the southernmost of the group, lies about 33 miles north-westward of Dumdum; it is a steep-to, bare, white rock, about 76 feet (23m2) high, and there is a large isolated rock close off its southern side.

Pengibu, the north-westernmost of these islands, lies about 8 miles west-north-westward of Kaju Ara; it is a small densely wooded island, 315 feet (96m0) high. Hughes droogte, about 4 cables in length and composed of coral, with a least depth of 3¼ fathoms (5m9) over it, on which the sea never breaks, lies about three-quarters of a mile south-westward of Pengibu, from which it is separated by a deep channel. Kaju Ara and Pengibu form good landmarks for vessels proceeding between Singapore and the north-western coast of Borneo.

Acasta rock, situated about 4 miles northward of Pengibu, is almost awash; in calm weather this rock is only marked by a slight discoloration of the water, but it breaks in the slightest swell.

Chart 361.

TAMBELAN EILANDEN.—Dangers.—Tambelan eilanden, situated north-eastward of Badas eilanden, comprise a considerable number of hilly islands and rocks north-eastward and south-westward of a fairly clear channel which divides them into two groups; there is good anchorage anywhere in this channel. Tambelan eilanden are of little importance to shipping. *See* view facing this page, and view on chart 361.

South-western group.—Dangers.—Tokong Mengirang, the south-easternmost of the islands and dangers comprising the Tambelan group, is situated about 18½ miles east-north-eastward of Djangkulan (page 45); it is a prominent white rock, 79 feet (24m1) high; foul ground extends about two cables south-westward and westward from Tokong Mengirang. Two pinnacle rocks, about 12 feet (3m7) high, lie near the south-western edge of the foul ground.

Mengirang besar lies with its southern extremity about 4¾ miles west-north-westward of Tokong Mengirang. The island, which is prominent and rises to an elevation of 593 feet (180m7) near its centre, is fringed by a narrow reef. Mengirang kechil, a hilly islet fringed by a reef which extends about 3 cables from its northern extremity, is separated from Mengirang besar eastward by a clear deep channel about one mile wide.

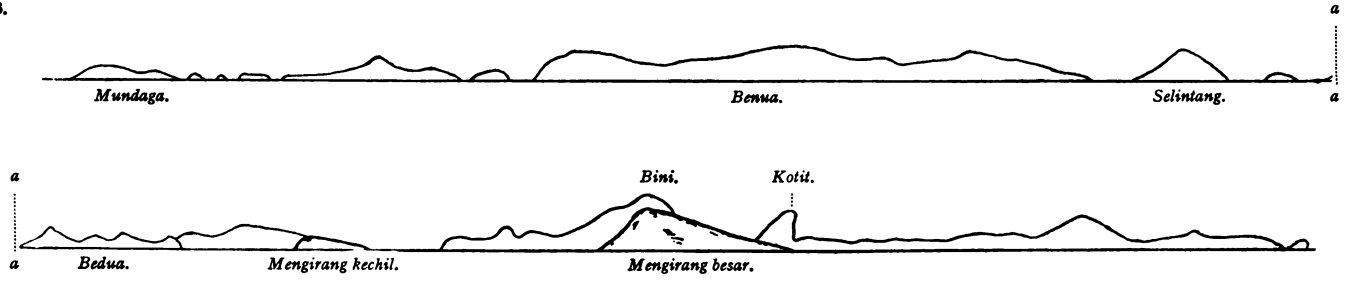
Karang Sobatan, with a least depth of 2¾ fathoms (5m0), coral, and steep-to, lies about a quarter of a mile westward of Mengirang kechil, from which it is separated by a deep and narrow channel. The eastern extremity of Batong in line with Bini, the highest peak of Tambelan, bearing about 021°, leads westward, and Tokong Mengirang (*Lat. 0° 51′ N., Long. 107° 37′ E.*), bearing about 100°, and open southward of Mengirang besar, leads southward of this shoal.

Kapala Tambelan is an islet lying about 3¼ miles west-north-westward of Mengirang kechil; a coral bank, with a least depth of 6½ fathoms (11m9) over it, lies about one mile south-westward of this islet.

Batong, an islet, 180 feet (54m9) high, lies in the south-eastern

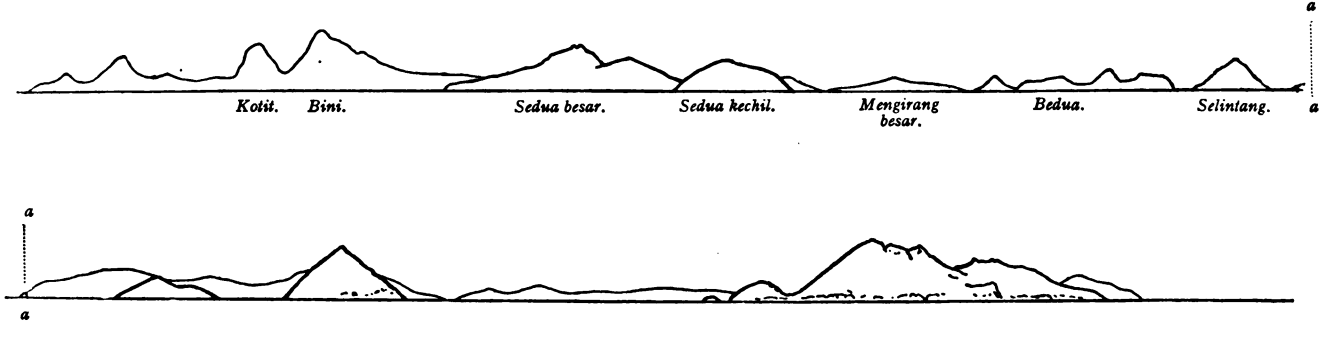
Chart 1263.

Digitized by Google



View, in two parts, of Tambelan eilanden from Rodger rock.

(*Original dated* 1914.)



View, in two parts, of Tambelan eilanden from Karang Laut.

(*Original dated* 1914.)

Digitized by Google

Digitized by Google

Chart 361.

entrance to the main channel between the two groups of these islands, about 3 miles north-north-westward of Mengirang besar; there is a safe channel on either side of it.

Bedua, an island, 403 feet (122m8) high, lies about 6 cables westward of Batong; it is fringed by a reef which extends about 6 cables southward. Untuk is an islet lying on the southern end of this reef. About one cable farther southward is Lipi, an islet fringed by a narrow reef, with a deep and narrow channel between.

Benua, the largest and highest island of the south-western group, lies with its southern extremity about 2¾ miles westward of Lipi; near its north-eastern end it attains an elevation of 940 feet (286m5). The island is fringed by a reef, which, on its south-eastern side, extends about half a mile offshore. A 4-fathom (7m3) patch lies about 4 cables north-north-westward of the north-western extremity of Benua, and a 1½-fathom (2m7) patch lies about 4 cables north-westward.

Karang Tengah, with a least depth of 2¾ fathoms (5m0) over it, lies on a bank in the southern entrance to the channel between Benua and Bedua, about 7 cables westward of Lipi.

Selintang, an island, 677 feet (206m3) high, lies close eastward of Benua; it is fringed by a narrow reef; a detached reef, which dries, lies in the northern entrance to the channel between these islands.

A rock, with a depth of 3 feet (1m0) over it, lies about 2½ cables north-westward of the northern extremity of Selintang, and a rock, with a depth of 1¾ fathoms (3m2) over it, lies about 1½ cables north-eastward of the same point; a 2-fathom (3m7) patch lies close north-eastward of the 1¾-fathom (3m2) rock.

Djela (Jela), an island, 265 feet (80m8) high, lies about 1½ cables north-eastward of Selintang, with a narrow deep channel between.

Leso, an island about a quarter of a mile westward of Benua, is fringed by a reef. A rock, above water, lies on the outer end of this reef, about a quarter of a mile south-westward of the southern extremity of the island. A bank, with a least depth of 2¾ fathoms (5m0) near its outer end, extends 6½ cables northward from the north-eastern side of the island.

Nangka, an island, lies three-quarters of a mile west-north-westward of Leso. Ibul, 532 feet (162m2) high, lies three-quarters of a mile north-westward of Benua. It is fringed by a reef on its northern side extending about 3½ cables offshore. Nibung is an islet lying about 2¼ cables south-westward of Ibul. Peling, an islet, fringed by a reef, lies about 8 cables northward of the north-eastern extremity of Ibul, with a deep channel, about 2 cables wide, between them. Tamban, 281 feet (85m6) high, lies 5½ cables northward of Ibul, with a 2-fathom (3m7) patch in the fairway between them. A bank, with a depth of 3¾ fathoms (6m9) at its outer end, extends about 2½ cables from the eastern side of Tamban.

Pandjang (Panjang) lies with its southern extremity about 7 cables westward of Ibul. Lintang lies close westward of the north-western side of Pandjang, with a narrow deep channel between them. Mundaga, 695 feet (211m9) high, lies about 4 cables west-north-westward of Lintang. Genting, 281 feet (85m6) high, lies 6½ cables north-north-eastward of Mundaga (*Lat. 1° 01′ N., Long. 107° 22′ E.*).

The narrow channels between the islands described above are mostly free from dangers, except that between Benua and Ibul, and that

Digitized by Google

Chart 361.

between Ibul and Tamban, which should not be used without local knowledge.

North-eastern group.—Dangers.—Tambelan, the south-eastern island of the north-eastern group, and the largest and most important of the Tambelan eilanden, lies with Tanjong Mandi Angin, its southern extremity, about 2 miles eastward of Batong. Near the north-eastern side of this island are three prominent peaks, of which Bini, 1,300 feet (396m2) high, situated about 4 miles northward of Tanjong Mandi Angin, has the greatest elevation. Kotit, a remarkable sloping peak, 953 feet (290m5) high, lies about one mile eastward of Bini, and Puter Djala (Puterjala), 950 feet (289m6) high, and cone shaped, lies about 1½ miles east-south-eastward of Kotit. (*See* view facing page 46.)

A reef, with a rock awash near its outer end, extends about 2½ cables south-south-westward from Tanjong Mandi Angin, between which point and Tanjong Kemantau, the eastern extremity of the island, there are several small bays all of which are encumbered with reefs. A reef extends about half a mile southward from Tanjong Kemantau; Batu Rakit, awash, with a 4-fathom (7m3) patch close eastward of it, lies near the outer edge of this reef.

The north-eastern coast of Tambelan is almost free from reef; Pilang besar and Pilang kechil lie, respectively, about half a mile offshore, and close to this coast, about 2½ miles north-westward of Tanjong Kemantau. A shoal, with a least depth of 3¼ fathoms (5m9) over it, lies about half a mile north-north-westward of Tanjong Antju (Anchu), the north-western extremity of the island.

Between Tanjong Bertumpa, about 4 cables north-westward of Tanjong Mandi Angin, and Tanjong Ajam, about 1¼ miles northward, is the entrance to Tambelan baai (page 49). Between Tanjong Ajam and Tanjong Antju the west coast of the island is fringed by reefs which extend in places about half a mile offshore. Kera and Betunde are islets lying on these reefs, about one mile and 1½ miles north-westward, respectively, of Tanjong Ajam.

Bungin, an islet, 282 feet (85m9) high, lies about 1¼ miles westward of Tanjong Antju. Foul ground extends about a quarter of a mile south-westward and half a mile north-eastward from the islet; a 3¾ fathom (6m9) patch lies about 4 cables south-south-westward of the islet, and a shoal, with depths of 1½ fathoms (2m7) over it, on which lie two small islets, Djangkulak (Jangkulak) and Rakit, lies close eastward of Bungin.

Sedua besar, 886 feet (270m0) high, and Sedua kechil, 650 feet (198m1) high, separated by a narrow channel, lie, respectively, about 1½ and 2½ miles west-north-westward of Tanjong Antju. A spit, with a depth of 3 fathoms (5m5) over it, extends about 1½ cables north-eastward from the eastern extremity of Sedua besar, and a detached shoal, with a least depth of 2½ fathoms (4m6) over it, lies in the northern entrance to the channel between them.

Sendulang besar, 791 feet (241m1) high, and cone shaped, and Sendulang kechil (*Lat. 1° 05′ N., Long. 107° 26′ E.*), 299 feet (91m1) high, lie about 3 miles north-westward of Sedua kechil; these islands are each fringed by a reef, and are separated by a deep and very narrow channel.

Uwi, the north-western island of the north-eastern group, rises to an elevation of 1,092 feet (332m8) near its eastern end, which lies about

Digitized by Google

Chart 361.

one mile north-westward of Sendulang besar. The eastern end of the island is fringed by reefs to a distance of about 4 cables offshore; Rakit, a small islet, lies near the south-eastern end of the reef, and another small islet near its north-eastern end. The north-eastern and north-western sides of Uwi are also fringed with reefs.

The narrow channels between the islands of the north-eastern group are also mostly free from dangers, except the channels between Sedua besar and Sedua kechil, and between Sendulang besar and Sendulang kechil, neither of which should be used without local knowledge.

Chart 361, plan of Tambelan creek.

Tambelan baai.—Dangers.—Beacons.—Tambelan baai nearly divides Tambelan island into two parts. The entrance is comparatively free from dangers, but within, the bay is encumbered with reefs, some of which are marked by privately maintained ball beacons. A few of the dangers near the entrance are described below; the positions of the remainder can best be seen on the chart.

The coast between Tanjong Bertumpa, the southern entrance point of the bay, and Tanjong Sadap, about $1\frac{1}{4}$ miles north-north-eastward, is fringed by a reef, on which there are some rocks, above water, which extends as much as $2\frac{1}{2}$ cables offshore. This reef was reported, in 1948, to have extended southward in the vicinity of Tanjong Sadap. The northern part of the reef is marked by two privately maintained ball beacons, painted white, and a similar beacon marks the edge of the reef about 2 cables northward of Tanjong Sadap.

A reef extends about 4 cables south-westward from Tanjong Ajam. A pinnacle rock, with a least depth of 2 fathoms (3^m7) over it, lies close within the entrance about $2\frac{1}{2}$ cables south-south-eastward of Tanjong Ajam. A reef, with a depth of about 2 feet (0^m6) over it, and a 2-fathom (3^m7) patch lie about one cable and $2\frac{1}{4}$ cables, respectively, east-south-eastward of Tanjong Ajam.

The village of Batu Lepu, situated near the head of the bay about 2 miles north-eastward of Tanjong Ajam, can be reached by boats through a channel marked by unofficial beacons. There is regular steamer communication with other ports in the Nederlandsch Oost-Indië.

A pier, 525 feet (160^m0) long, with a depth of about 2 feet (0^m6) alongside, is situated on the north-western shore of the bay about 4 cables south-westward of Batu Lepu.

Anchorage.—During the North-east monsoon vessels can anchor in the entrance to Tambelan baai, but this anchorage is unsafe during the South-west monsoon, when better anchorage can be found by vessels with local knowledge north-westward of Tanjong Sadap.

Chart 361.

Outlying dangers.—Karang Laut, with a least depth of $3\frac{3}{4}$ fathoms (6^m9) over it, which does not show, lies about $4\frac{3}{4}$ miles north-north-eastward of Uwi (*Lat. 1° 06′ N., Long. 107° 24′ E.*).

Tokong Belajar, about 10 miles north-north-eastward of Sedua besar, consists of two prominent boulders, the higher having an elevation of 123 feet (37^m5), lying on a flat rock, from which a reef extends about 2 cables southward. *See* view on chart 361.

Chart 2660a.

Alida shoal, with a least depth of 10 feet (3^m0) over it, and steep-to, lies $15\frac{1}{2}$ miles eastward of Tanjong Kemantau (page 48). To clear

Digitized by Google

Chart 2660a.

this shoal the angle between the summit of Mengirang besar (*Lat. 0° 53′ N., Long. 107° 32′ E.*) and Bini peak, on Tambelan must be kept greater than 025°, or less than 023°.

NATUNA EILANDEN.—Natuna eilanden are the easternmost of the Tudjuh eilanden, and extend in a north-north-westerly direction for about 190 miles from Tanjong Api, the north-western extremity of Borneo; they are divided into three groups named, respectively, Zuid (South) Natuna, Groot (Great) Natuna and Noord (North) Natuna eilanden.

Chart 2104.

Zuid Natuna eilanden. — Dangers. — Lights. — Zuid Natuna eilanden, separated from the north-western coast of Borneo by Api passage (page 85), consists mainly of two groups, of which the southern are high and rocky and the northern low and flat; nearly all the islands are planted with coconut trees to a certain extent. There are only a few regular villages.

St. Petrus or Muri, situated about 41 miles westward of Tanjong Api, consists of two densely wooded islets joined by a drying reef; a narrow reef fringes both islets. The western islet is the larger, the eastern islet is 279 feet (85^{m}0) high. There is anchorage, in depths of about 16 fathoms (29^{m}3), northward of the reef joining the islets, or close to the southern side of the larger islet, according to the prevailing wind.

A light is exhibited, at an elevation of 331 feet (100^{m}9), from a white iron framework structure, 66 feet (20^{m}1) in height, on the summit of the western islet.

St. Petrus rots, 8 feet (2^{m}4) high and steep-to, lies about 2 miles southward of St. Petrus islet; there is a deep channel between them.

Merundung, the southernmost island of the southern group, lies about 15½ miles west-north-westward of Tanjong Api. It is a swampy island mostly covered with mangroves, with two low hills, covered with lofty trees, which are prominent near its centre. The tops of the trees have an elevation of 118 feet (36^{m}0).

A light is exhibited, at an elevation of 117 feet (35^{m}7), from a white iron framework structure, 98 feet (29^{m}9) in height, near the middle of Merundung (*Lat. 2° 04′ N., Long. 109° 06′ E.*).

A reef, which dries, lies about half a mile west-south-westward of the northern extremity of Merundung, with a shoal, with a depth of one fathom (1^{m}8) over it, situated close westward of the reef; in 1939, breakers were reported close off the north-western end of this reef; a 2¾-fathom (5^{m}0) patch lies about 1¼ miles north-north-eastward of the same point, and a 5-fathom (9^{m}1) patch about one mile north-eastward.

Banks, with depths of less than 10 fathoms (18^{m}3) over them, extend about 14 miles north-eastward from Merundung; a coral patch, with a depth of 4¼ fathoms (7^{m}8) over it, lies on one of these banks about 10 miles north-eastward of that island.

Sembuni reefs consist of several rocky heads, with depths of less than 3 fathoms (5^{m}5) over them; the westernmost, awash, lies about 9½ miles northward of Merundung. From this position the reefs extend east-north-eastward for about 7½ miles, with a 2-fathom (3^{m}7) patch near the eastern end.

Zuid Hooiberg (South Haycock), an islet, 467 feet (142^{m}3) high,

Digitized by Google

Chart 2104.

fringed by a reef about one cable wide, lies about 17 miles north-westward of Merundung; a rock, above water, lies close south-westward of this islet.

Malu reefs, composed of coral, lie eastward of Zuid Hooiberg; the south-western shoal, with a least depth of 1½ fathoms (2m7), over it, lies about 4¼ miles east-south-eastward of that island. The north-eastern shoal, with a least depth of 2¾ fathoms (5m0) over it, lies about 11 miles east-north-eastward of the south-western shoal; between them are several detached reefs, three of which have sandy cays, which dry about 7 feet (2m1). The channel between Sembuni reefs, and Zuid Hooiberg and Malu reefs is clear.

Serasan passage, which is free from dangers, lies between Zuid Hooiberg and Malu reefs on the southern side, and Serasan and its adjacent islands, about 7½ miles north-north-westward. Perhantuan, a steep-to islet, 477 feet (145m4) high, and densely wooded, lies in the eastern entrance to the passage, about 2½ miles southward of the south-eastern point of Serasan. A bank, with a least depth of 8 fathoms (14m6) over it, lies in the western entrance to the passage about 4½ miles south-westward of Park point, the southern extremity of Serasan.

Serasan and adjacent islands.—Dangers.—Beacons.—Serasan is one of the most important of the Zuid Natuna eilanden, and the residence of the Administrator of the group. The island is mountainous, rising near its south-western end to an elevation of 1,444 feet (440m1). Koti, a hill situated near Tanjong Koti, the north-western point of the island, is nearly vertical on its western side, with prominent, bare, red patches; it attains an elevation of 758 feet (231m0). There is a small isolated hillock on the north-eastern point of the island, which appears from a distance as a separate islet.

Chart 2140, plan of Royalist haven.

Close westward of Serasan, from which it is separated by Royalist haven (page 52), is an extensive reef on which there are several islands. Tebeian besar, 744 feet (226m8) high, the westernmost island, with Tebeian kechil close north-eastward, lies near the outer edge of the reef with its south-eastern extremity about 4 miles westward of Park point. Hadji (Haji), the southernmost islet, is situated on a detached reef about 2½ miles west-south-westward of Park point. On the eastern part of the reef, northward of Hadji, lie Perajun (Perayun), 359 feet (109m4) high, and the Gordon islands, the southernmost of which is 359 feet (109m4) high, and the northernmost, 213 feet (64m9) high, and is close to the northern edge of the reef. In addition to the islands named there are also several smaller islets.

Batu Patjil (Pachil), a detached coral shoal, with a least depth of 1½ fathoms (2m7) over it, marked on its eastern side by a black beacon surmounted by a truncated cone, lies on the western side of the fairway in the entrance to Royalist haven, about 6½ cables west-south-westward of Park point.

Batu Hol, a coral shoal, awash near its western end, lies about a quarter of a mile south-westward of Park point (*Lat. 2° 29′ N., Long. 109° 01′ E.*); the western edge of this shoal is marked by a white beacon surmounted by a ball.

Chart 2104.

The southern and eastern coasts of Serasan are fringed by reefs

Digitized by Google

Chart 2104.

which, in the bight eastward of Park point, extend as much as three-quarters of a mile offshore.

The west coast of Serasan between Klapperhuk, situated on the northern side of the western entrance to Royalist haven, about 3½ miles north-westward of Park point, and a point about 1¼ miles northward, is fringed by a reef which extends from about half a cable to 2 cables offshore.

A bank, with depths of from 2 to 3¼ fathoms (3m7 to 5m9) over it, extends about 1½ miles north-eastward from Tanjong Koti, situated 2 miles northward of Klapperhuk. A 1¼-fathom (2m3) patch lies about 3½ cables offshore about 2 miles east-north-eastward of Tanjong Koti. Between the point situated about 2½ miles eastward of Tanjong Koti and a point about 4½ miles east-south-eastward, there is a sandy bay. Foul ground extends about 3½ cables from the western entrance point of this bay, and shoals, with depths of 3 fathoms (5m5) and less over them, lie within one mile of this coast.

A group of islands and shoals lies within about 7½ miles north-north-eastward of the north-eastern point of Serasan; Genting, the southernmost island, 377 feet (114m9) high, lies with its southern extremity about one mile eastward of the same point.

Peanjamuk, a small islet, 242 feet (73m8) high, lies about 1½ miles west-north-westward of the northern extremity of Genting; two shoals, with depths of 4½ fathoms (8m2), and 4¾ fathoms (8m7) over them, lie, respectively, about 6 cables westward and 2½ miles west-north-westward of Peanjamuk.

Sempadi, 541 feet (164m9) high, lies about 2¼ miles north-north-eastward of Genting; a 1¼-fathom (2m3) patch lies about one mile westward, and a shoal, with a least depth of 6 fathoms (11m0) over it, lies 1½ miles east-north-eastward of Sempadi.

Sedua, a hilly islet, from which a reef extends about 3 cables southward, lies about 1¾ miles north-north-westward of Sempadi; close south-westward of this islet, and separated from it by a very narrow, deep channel, is a reef, on which are the small islets of Rikel and Banjo.

Kepala, the northern islet of the group, situated about 1½ miles north-eastward of Sedua, is a low rock, fringed by a reef on its eastern side.

Chart 2140, plan of Royalist haven.

Royalist haven. — Dangers. — Light. — Beacons. — Royalist haven, the name given to the whole of the narrow passage between Serasan and the extensive reef south-westward, affords good shelter at all seasons. It is entered between the beacons marking Batu Patjil and Batu Hol. There is regular steamer communication with other ports in the Nederlandsch Oost-Indië.

Most of the shoals in the southern part of the channel of Royalist haven are marked by privately maintained beacons; those on the eastern side of the fairway are surmounted by white balls; those on the western side by black cones. The positions of these shoals and the beacons marking them can best be seen on the chart.

Between Macdowal point (*Lat. 2° 30′ N., Long. 109° 01′ E.*), about 1¼ miles north-westward of Park point (page 51), and Klapperhuk, the eastern side of the haven, forms a bay, most of which is encumbered by drying reefs; the village of Palempa (Ayer Sekian) stands at the eastern corner of this bay; it is not visible from the northern anchorage, but can be reached by boats through a narrow channel marked

Digitized by Google

Chart 2140, plan of Royalist haven.

by beacons. There is a pier about 1¼ miles north-eastward of Macdowal point, but it is difficult of access at low water.

A light is exhibited, at an elevation of 9 feet (2m7), from a white beam under a white shed, 6 feet (1m8) in height, on the head of the pier.

Palempa is the residence of the Administrator of Zuid Natuna eilanden.

Anchorages.—Directions.—There is good anchorage, in depths of from 8 to 10 fathoms (14m6 to 18m3), about 2 cables south-westward of Tanjong Bilin, situated 4½ cables southward of Macdowal point, or farther northward, according to the monsoon.

Charts 2140, plan of Royalist haven, 2104.

A vessel approaching Royalist haven should keep Tanjong Bilin in line with Koti hill, bearing about 336° (*see* view on chart 2140), which leads between the shoals at the entrance. When Park point comes in line with the south-eastern extremity of Serasan, bearing about 083°, she should alter course westward, and keep the outermost detached rock off Klapperhuk in line with the north-eastern extremity of the largest of the Gordon islands, bearing about 319°, which leads to the anchorage. If proceeding to a berth farther northward, the vessel must be conned by eye between the reefs westward of Macdowal point until the easternmost Gordon island comes in line with the eastern side of Hadji, bearing about 206°, and a berth taken up as convenient on this bearing.

A vessel approaching from westward should take care not to mistake one of the privately maintained beacons marking the shoals in the southern part of the haven for the beacon marking Batu Patjil.

During the South-west monsoon there is well sheltered anchorage, in a depth of 5½ fathoms (10m1), off the north-western entrance to Royalist haven with the south-western side of Tebeian kechil in line with the summit of Perajun, bearing about 129°, taking care to avoid the 1½- and 2¾-fathom (2m7 and 5m0) shoals, situated, respectively, about half a mile northward and north-north eastward of the northern extremity of Tebeian besar.

Chart 2104.

Koti passage.—Dangers.—Koti passage lies between the Serasan group and the islands of Pandjang (Panjang) and Kerdau, about 10 miles north-north-westward. Haynes shoal, with a least depth of 3½ fathoms (6m4) over it, lies in the fairway about 8 miles westward of Tanjong Koti (*Lat. 2° 33′ N., Long. 108° 59′ E.*); with this exception the passage is clear of dangers in the fairway. The northern extremity of Serasan in line with the northern hill on Genting (page 52), bearing about 098°, leads northward of Haynes shoal.

For the southern side of the channel, *see* page 52.

Seraja (Seraia), situated on the northern side of the western approach to the passage, about 25 miles west-north-westward of Tanjong Koti, is a hilly island rising near its centre to two peaks, of which the southern, 829 feet (252m7) high, is the higher. The eastern side is low and sandy and fringed by reefs. The northern part of the western side is fringed by a reef, and a 4½-fathom (8m2) patch lies about 4 cables off this part; a ridge of rocks, with a least depth of 3 feet (0m9) over it, lies close off the western side about 1½ miles from the southern extremity of the island. Outside these dangers the island is steep-to. Dua rots, 62 feet (18m9) high, lies about 1½ miles east-north-eastward of

Digitized by Google

Chart 2104.

the northern extremity of Seraja, from which it is separated by a channel, with depths of 6 fathoms (11m0). This rock is surrounded by a reef and should not be approached within a distance of half a mile. A 7-fathom (12m8) patch lies about 2 miles south-eastward of Dua rots.

Jaring reef, with a least depth of 2 fathoms (3m7) over it, coral, lies about 3½ miles northward of Dua rots; a 5 fathom (9m1) patch lies about 3¼ miles north-north-eastward of this reef.

Swanley rock, with a least depth of 2¼ fathoms (4m1) over it, coral, and Pumubabung reef, awash, lie, respectively, about 4¼ miles and 8½ miles eastward of Dua rots.

Jabak reef, awash, lies about 3 miles north-north-westward of Pumubabung reef. A coral shoal, with a least depth of 2 fathoms (3m7) over it, lies about 2 miles westward of Jabak reef.

Latu rots, consisting of a black boulder on a dry sandbank, surrounded by a reef, with a 3-fathom (5m5) patch close southward of it, lies about 4¾ miles east-south-eastward of Jabak reef; a 1½-fathom (2m7) coral patch lies about midway between.

Pandjang (Panjang) is a low island lying on a reef which extends as much as 2¼ miles off its southern end; Kerdau is a low islet near the southern end of the reef about 1¼ miles southward of the south-western extremity of Pandjang. There is regular steamer communication between Pandjang and other ports in the Nederlandsch Oost-Indië. A rock, with a depth of 3 feet (0m9) over it, lies one mile south-westward of Kerdau, and a 1½-fathom (2m7) patch lies 1¼ miles west-south-westward of the same islet. A rock, with a depth of 1¾ fathoms (3m2) over it, lies about 4 miles west-south-westward of Kerdau.

Djapu (Japu) and Sebiang are two low islets, covered with coconut trees, on a drying coral reef, and are situated about 2¼ miles west-north-westward and 2 miles north-westward, respectively, of the south-western extremity of Pandjang. A clump of trees stands on the reef between these islets. A detached rock, with a depth of less than 6 feet (1m8) over it, lies about one mile north-westward of the south-western extremity of Sebiang.

Mambat, about 3¼ miles north-eastward of Sebiang, is a low islet covered with coconut trees; it lies on a narrow reef, parts of which dry, which extends about 1¼ miles south-westward and north-eastward from the islet.

The channel between Pandjang on the south-eastern side, and the three islets described above, on the north-western side, is clear of dangers, except for the rock, with a depth of 1¾ fathoms (3m2) over it, in the south-western approach, described above.

Robin Hood reef, about 4½ miles eastward of Mambat, dries, and from it a spit, with depths of 2 fathoms (3m7) over it, extends about 2 cables west-south-westward; the northern extremity of Sebiang (*Lat. 2° 46′ N., Long. 108° 53′ E.*) in line with the southern peak of Seraja, bearing about 253°, leads close southward of this reef. There is a clear channel between Robin Hood reef and Pandjang, and between Robin Hood reef and a 5-fathom (9m1) patch situated about 2 miles east-north-eastward of Mambat.

Current.—During the South-west monsoon the current has been observed to set northward in Koti passage, with a rate of 2½ knots.

Subi eilanden.—Light.—Dangers.—Subi besar is a low, flat island with a few undulating hills near its north-western end. The

Digitized by Google

Chart 2104.

southern extremity of the island lies 7¾ miles north-westward of the northern extremity of Pandjang. A bank, with depths of less than 5 fathoms (9m1), over it, extends about 2 miles southward and 3½ miles south-westward from the southern end of the island. A rock, with a depth of 3 feet (0m9) over it, lies about 5½ miles south-westward of the south-western side of the island, and a shoal, with a least depth of 4¾ fathoms (8m7) over it, lies about one mile east-north-eastward of the rock.

The northern part of Subi besar is fringed by reefs which extend about 4 miles north-north-eastward from its northern extremity, and as much as 3½ miles from its western and eastern sides.

Bakau, a hilly islet, about 3 miles westward of the western extremity of Subi besar, is fringed with reefs, which extend about 3 cables from its northern end. A rock, awash, lies about 4 cables west-north-westward of the northern extremity of the islet, and a spit, with a depth of 4¼ fathoms (7m8) over it, extends 4 cables from the north-eastern side.

Tudang, about 1¼ miles eastward of the northern extremity of Bakau, is low and covered with coconut trees; it is fringed by a reef, and a spit, with a depth of 4¼ fathoms (7m8) near its outer end, extends about 8 cables north-westward from it. The channel between Tudang and the coastal reef eastward is foul.

Dengajak, a low islet covered with coconut trees, lies on the coastal reef, about 3 miles north-eastward of Tudang. Two shoals, with depths of 3½ fathoms (6m4) and 2½ fathoms (4m6), over them, lie respectively, about 1½ miles south-westward and 1¼ miles westward of Dengajak.

Subi kechil, which rises near its northern end to an elevation of 259 feet (78m9), lies on the coastal reef close northward of Subi besar.

A light is exhibited, at an elevation of 270 feet (82m3), from a white iron framework structure, 72 feet (21m9) in height, on the summit near the northern end of Subi kechil.

Ria rots (*Lat. 3° 04′ N., Long. 108° 53′ E.*), a prominent barren, white rock, lies close to the north-eastern edge of the coastal reef, about one mile north-eastward of the north-eastern extremity of Subi kechil; two prominent overgrown islets lie close inshore between them.

Tembelai is an islet lying on a reef, which dries, about 1¾ miles south-eastward of the south-eastern extremity of Subi besar; the passage between them is foul. Several shoals, with depths of from one to 6 fathoms (1m8 to 11m0) over them, extend about 5½ miles south-westward from Tembelai.

Laut rif lies about 4½ miles north-eastward of Tembelai, and about 1¾ miles from the coastal reef on the eastern side of Subi besar; on it there are some drying rocks, amongst which are the remains of a wreck. A 1½-fathom (2m7) patch lies close northward of the northern extremity to this reef.

Serdang reef, steep-to and with a least depth of 3½ fathoms (6m4) over it. coral, lies about 8¼ miles eastward of the northern extremity of Subi besar.

Anchorages.—There is good anchorage off the lighthouse, northward of Subi kechil. A narrow passage leads through the reef here to a sandy beach where landing is always practicable. Boats using this passage should be careful to guard against a strong current that sets across it.

Charts 2660a, 1263.

Digitized by Google

Chart 2104.

The village of Batu Priuk, the principal village in the Subi group, is situated on the southern side of Subi kechil. There is a basin in the reef here which affords good anchorage for small craft with local knowledge; it is reached by a narrow passage through the coastal reef on the eastern side of the island. There is good anchorage off the entrance to this passage.

Chart 2660a.

Outlying banks.—Two banks, with depths of 8 fathoms (14m6) and 15 fathoms (27m4) over them, were reported, in 1950, to lie about 25 miles north-north-eastward and 49 miles north-eastward, respectively, of the light-structure on Subi kechil.

Chart 1348.

Groot Natuna eilanden.—In addition to Groot (Great) Natuna and the islands in the immediate vicinity, this group consists of Midai and Noord Hooiberg. All these islands are sparsely populated, and are principally under coconut cultivation. With the exception of Sedanau (page 60), off the western side of Groot Natuna, they are of no importance to shipping.

Midai.—Beacons.—Buoyage.—Midai, about 60 miles westward of Subi kechil, is low near the coast, and rises gradually towards the centre. The summit, 588 feet (179m2) high, consists of three peaks, of almost equal elevation, close together, of which only two are visible from most directions. The lower parts of the island are covered with coconut plantations. The population of about 500 is evenly divided between Orang Lauts and Malays, who are subject to a Rajah. The principal villages are Sabang Barat near the north-western point of the island, and Seblat near the middle of the southern coast. There is regular steamer communication with other ports in the Nederlandsch Oost-Indië.

Midai is fringed by a narrow reef, on the western part of which is a small islet on which there are a few bushes. Outside the fringing reef numerous detached shoals, with depths of 6 fathoms (11m0) and less over them, extend as much as 2½ miles offshore; the positions of these can best be seen on the chart.

Two rocks, with depths of 10 and 7 feet (3m0 and 2m1) over them, lie about 5 and 6½ cables, respectively, south-westward of the north-western extremity of the island; they are marked by a black buoy and a white buoy, respectively. Two beacons on the coast in line, bearing 089°, lead between these rocks; the front beacon is an iron post, surmounted by a white triangle point up; the rear beacon consists of a black and white cross with a white triangle point down, below it, on a tree which is painted white. Neither the beacons nor the buoys are maintained officially.

Anchorages.—Light.—The best anchorage for vessels with local knowledge during the South-west monsoon, is off the village of Sabang Barat (*Lat. 3° 00′ N., Long. 107° 45′ E.*), in a depth of about 7 fathoms (12m8), with the Chinese store bearing 145°. This store is situated on the north-eastern side of a break in the reef, and near it is a stone pier, where boats can land except at low water. Care should be taken, however, to avoid the above-mentioned two rocks situated south-westward of the north-western extremity of the island.

A light is exhibited, at an elevation of 12 feet (3m7), from a white

Digitized by Google

Chart 1348.

wooden post, 13 feet (4m0) in height, on the pier-head ; there is a flag-staff at the root of the pier.

During the North-east monsoon the best anchorage, for vessels with local knowledge, is, in a depth of about 10 fathoms (18m3), off Seblat village, with the south-eastern extremity of Midai bearing 055°, and the village about 316°. There is an opening in the shore reef abreast the village, at the head of which there is good landing for boats.

Off-lying dangers.—Jackson reefs, with depths of from 3 to 7 fathoms (5m5 to 12m8) over them, lie about 2¾ miles eastward of the south-eastern extremity of Midai. A detached coral shoal, with a least depth of 3½ fathoms (6m4) over it, lies about 1½ miles north-eastward of the main reef. There is a clear channel between these reefs and the dangers off the eastern coast of Midai.

Diana riffen consist of several coral patches in two main groups ; the southern group, with a least depth of 3 fathoms (5m5) over it, lies about 2¾ miles northward of Midai ; there is a clear channel between this group and the dangers extending northward from that island. The northern group lies about 2 miles farther northward ; the shoalest spot, with a least depth of 1¾ fathoms (3m2) over it, lies near the southern side of the reef, about 6½ miles northward of the north-western extremity of Midai. There is a 3-fathom (5m5) patch near the south-western end of the group, and there are 2- and 3-fathom (3m7 and 5m5) patches at the north-eastern end. An isolated patch, with a depth of 2 fathoms (3m7) over it, coral, which does not show by discoloration, lies about 14 miles northward of the south-eastern extremity of Midai.

Islands and dangers northward of Midai.—Noord Hooiberg, a small conical islet, 211 feet (64m3) high, lies about 21 miles north-westward of the north-western point of Midai. It stands on a bank on which are several shoals, with depths of from 2½ to 6 fathoms (4m6 to 11m0) ; the positions of these can best be seen on the chart. Two detached shoals, with least depths of 3¾ fathoms (6m9), and 4½ fathoms (8m2) over them, lie, respectively, about 3 miles south-south-westward, and 2½ miles south-south-eastward of the islet. There is a clear channel between the shoals south-eastward of Noord Hooiberg and Diana riffen.

Postiljon (Postillion) rotsen, about 18 miles east-north-eastward of Noord Hooiberg, consist of two prominent rocks close together, 54 feet (16m5) high, of which the southern is the larger. The group lies near the middle of a bank, with depths of less than 10 fathoms (18m3) over it, on which the depths are irregular.

A rock, awash, lies about 1½ cables south-south-westward of the rocks ; two 4¼-fathom (7m8) patches lie, respectively, about one mile southward, and the same distance north-north-westward ; and a 5½-fathom (10m1) patch lies near the edge of the bank, about 2¼ miles eastward of Postiljon rotsen (*Lat. 3° 24′ N., Long. 107° 51′ E.*).

The channels between the banks surrounding Noord Hooiberg and Postiljon rotsen, and between the latter and Diana riffen are clear of dangers, with the exception of the 2-fathom (3m7) patch north-eastward of Diana riffen.

Chart 2140, plan of La Place strait.

Duperré eilanden.—Duperré eilanden are a group of moderately high wooded islands lying close off the south-western side of Groot Natuna. Sededap, the south-western island of the group, lies about 15 miles north-eastward of Postiljon rotsen ; it consists principally of

Digitized by Google

Chart 2140, plan of La Place strait.

a wooded ridge, which rises steeply on its western side to an elevation of 920 feet (280m4). The village of Telok Labu, situated at the head of a small cove close eastward of the northern point of the island, is inhabited by Orang Lauts and Malays; the former are employed boat building and fishing, and the latter in coconut cultivation.

Antu (*Lat. 3° 36′ N., Long. 108° 04′ E.*), an islet covered with coconut trees, lies about 3 cables north-eastward of the north-eastern point of Sededap.

Selentang, a narrow, hilly ridge, 320 feet (97m5) high, with Bulu, a small islet, 194 feet (59m1) high, close northward of it, lies about 4 cables northward of Sededap.

Lagong lies with its western extremity about one mile eastward of the north-eastern extremity of Sededap; it has two prominent peaks, one, rising from an elevated ridge near its north-eastern side, attains an elevation of 1,624 feet (495m0); the other, an isolated sharp pointed peak, 1,471 feet (448m3) high, lies about 1¼ miles south-south-westward.

The south-western part of Lagong consists of a promontory, on which is a lower hilly ridge with three rounded summits. There is a village close to the southern coast of the island abreast Genting. For the north-eastern side of the island, *see* below.

Genting is an islet consisting of two hills connected by a neck of low land; it lies close south-eastward of the south-western promontory of Lagong, to which it is joined by a sandy spit.

All the islands described above are situated on an extensive reef, which, on the eastern side of Sededap, extends about 4 cables offshore, with a 3-fathom (5m5) patch about 1½ cables outside it. Two detached shoals, with depths of one fathom (1m8), and 1¼ fathoms (2m3) over them, lie, respectively, about 6 cables south-westward and 4½ cables north-westward of the summit of Selentang.

Batang, an island lying with its south-western extremity about 9 cables north-north-eastward of Bulu, consists principally of a hilly ridge, which rises to an elevation of 1,624 feet (495m0) near its centre; an isolated hill, 871 feet (265m5) high, lies near its north-western extremity.

The southern and western coasts of Batang are fringed by reefs and foul ground. For the north-eastern side of the island, *see* below.

There is a deep channel, leading into Straat Laplace, between the reefs extending southward from Batang, and those fringing the southern islands of the group. There is good anchorage during the South-west monsoon, in depths of from 6 to 6½ fathoms (11m0 to 11m9), in the western entrance to this channel about midway between Bulu and the south-western extremity of Batang. *See* view facing page 59.

Straat Laplace.—Dangers.—Straat Laplace separates Duperré eilanden from the south-western side of Groot Natuna; a strong current sometimes sets through the strait.

Burung, about 2 miles north-north-westward of the north-western extremity of Batang, is a rock, 89 feet (27m1) high, near the middle of a coral reef, which extends about 4 cables north-north-westward, and south-south-eastward from it.

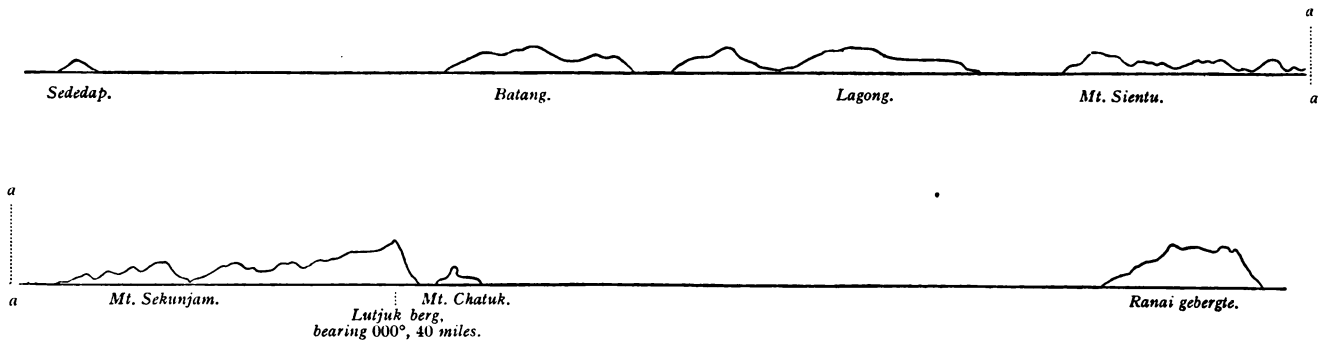
With the exception of a shoal, with a least depth of 4½ fathoms (8m2) over it, situated about a quarter of a mile northward of its north-western end, the north-eastern side of Batang is free from dangers.

Komang is a hilly island, 610 feet (185m9) high, situated on the

Digitized by Google

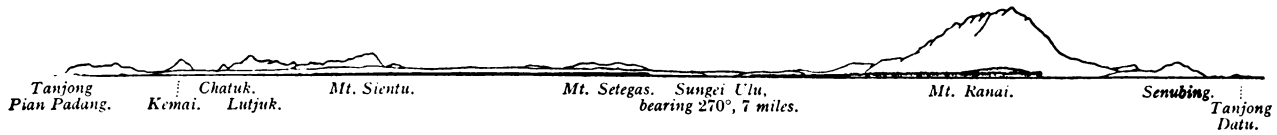
Digitized by Google

To face page 59.



View, in two parts, of Groot Natuna eilanden from southward.

(*Original dated* 1914.)



Sungei Ulu entrance.

(*Original dated* 1914.)

Digitized by Google

Chart 2140, plan of La Place strait.

northern side of the western entrance to the strait; it lies on the reef which extends westward from the south-western extremity of Groot Natuna (*Lat. 3° 41′ N., Long. 108° 06′ E.*). There is anchorage southward of the island.

The north-eastern shore of the strait between Komang and Tanjong Lampa, the eastern entrance point at the south-eastern end, is fringed by a narrow reef.

Verdier rif, with a least depth of about one foot (0m3) over it, lies nearly in mid-channel, about 2 miles south-eastward of the southern extremity of Komang.

A narrow reef fringes the north-eastern side of Lagong. Semasin, a low islet, and Serantas, a wooded islet 384 feet (117m0) high, lie on the southern side of the eastern entrance, 2 cables and half a mile eastward, respectively, of the eastern extremity of Lagong; both these islets are fringed with reefs.

Chart 1348.

Groot Natuna.—Groot (Great) Natuna, the largest island of the group, is almost divided into two unequal parts by Kuala Bindjei and Sungei Penarik, which together extend from its south-western coast to within half a mile of its south-eastern side. Tanjong Lampa, the southern extremity of the island, lies about one mile east-north-eastward of Serantas.

Charts 2140, 1348.

Southern side of Groot Natuna.—Aspect.—For the coast between Komang and Tanjong Lampa, *see* page 58.

The coast between Tanjong Lampa and Tanjong Pian Padang, the south-eastern extremity of the island, about 8½ miles eastward, is fringed by a reef which extends in places about one mile offshore.

Near the western extremity of the peninsula on the southern end of the island, there is a ridge of mountains which follows the southern coast of the island for about 7 miles; Sientu, 1,718 feet (523m6) high, a precipitous mountain with a ridge of fantastic shape, surmounted by three prominent peaks, lies on the western part of this range about 4½ miles north-north-westward of Tanjong Lampa. From Sekunjam, 1,575 feet (480m0) high, about 3¼ miles south-eastward of Sientu, a ridge, with low summits, trends 1½ miles eastward to Lutjuk (Luchuk), a sharp peak, 1,969 feet (600m1) high, which is connected by a narrow ridge to Tjatuk (Chatuk), a lower sharp peak, about three-quarters of a mile east-north-eastward. (*See* view facing this page).

Eastward of Tjatuk the hills become more scattered. Lintang, about 3¼ miles east-north-eastward of Tjatuk, is a remarkable sharp pointed peak; Kemai and Silemut, twin peaks, each 807 feet (246m0) high, rise about 2 miles east-south-eastward of Lintang.

Chart 2140, plan of La Place strait.

Coast.—Dangers.—Tanjong Lampa (*Lat. 3° 38′ N., Long. 108° 10′ E.*) is a bare rugged point, the extremity of a lofty spur of the mountain range northward.

Telok Tukak, which vessels occasionally visit to load timber, is entered between Tanjong Lampa and a point about 2 miles east-north-eastward; this latter point rises from the coast to three prominent low hills separated from Lutjuk by a deep valley; when seen from the offing these hills appear as an island. The greater part of Telok Tukak is encumbered with reefs.

Charts 2660a, 1263.

Digitized by Google

Chart 2140, plan of La Place strait.

Tengah village is situated at the mouth of Sungei Tengah about 3¾ miles east-north-eastward of Tanjong Lampa. Two islets lie on the coastal reef off this village; Sekukur, the eastern islet, is a barren rock; the western islet is low and covered with coconut trees.

Chart 1348.

Tanjong Pian Padang is a low sandy point, rising about half a mile inland to an elevation of 675 feet (205m7) at Pian Padang hill. A spit, with a depth of 3½ fathoms (6m4) over its outer end, extends about 1½ miles east-south-eastward from Tanjong Pian Padang; a shoal, with a least depth of 5 fathoms (9m1) over it, lies about 2½ miles south-eastward of that point.

There is anchorage for small vessels with local knowledge, in depths of 4 fathoms (7m3), about 3 cables offshore, in the bay formed by Tanjong Pian Padang and a tongue of the coastal reef about one mile westward of it.

Charts 2140, plan of La Place strait, 1348.

Western side of Groot Natuna.—Coast.—Between Cape Lagong, the western extremity of Komang (page 58), and Tanjong Belitung, about 12 miles north-north-westward, the coast forms a bay, into the head of which is Kuala Bindjei (Binjei). From Tanjong Belitung to Tanjong Pajung (Payung), the western extremity of the island, about 8 miles north-north-westward, the coast is fringed with reefs, which extend as much as 1¼ miles offshore, and fronted by islands and dangers.

Chart 1348.

Approaches to Kuala Bindjei.—Islands and dangers.—Light.—Beacons.—Batu Neneh, a small reef, with a least depth of a quarter of a fathom (0m5) over it, on which the sea breaks heavily, lies about 6½ miles westward of Burung (page 58). Burung in line with the summit of Sientu (page 59), bearing 088°, leads close southward of the reef.

A steep-to rock, with a least depth of 3 fathoms (5m5) over it, lies about 6½ cables off the coastal reef, and one mile northward of Komang.

Serval rif, with a least depth of 1¼ fathoms (2m3) over it, lies about 2¾ miles north-north-westward of Burung; within a distance of 2 miles east-south-eastward of this reef there are several shoals, with depths of from 4 feet to 2¾ fathoms (1m2 to 5m0) over them, the positions of which can best be seen on the chart.

Charts 2140, plans of La Place strait and Sedanau channels, 1348.

Sedanau, a prominent hilly island, rising to an elevation of 732 feet (223m1) near its south-western extremity, lies off the entrance to the bay mentioned above, with Tanjong Semulut, its southern extremity, about 4 miles northward of Burung. The island is divided into two parts by Selat Pemutus, a narrow creek, and is fringed by an extensive reef, which extends as much as 1¼ miles from its western side, 8½ cables from its northern end and about 4 cables from its eastern side.

Chart 2140, plan of Sedanau channels.

Semalah (*Lat. 3° 47′ N., Long. 108° 02′ E.*) is a small islet situated on the reef in the south-western entrance to Selat Pemutus, about one mile north-north-westward of Tanjong Semulut.

Tokong, a rock on which there are some coconut trees, lies near the western edge of the reef, 5½ cables southward of Tanjong Tabi, the western extremity of Sedanau, which lies about 3½ miles north-west-

Digitized by Google

Chart 2140, plan of Sedanau channels.

ward of Tanjong Semulut. A large rock, above water, lies 4 cables south-south-eastward of Tokong.

There is an inlet in the reef on the eastern side of Sedanau, about 2 miles northward of Tanjong Semulut, at the head of which is situated the Chinese settlement of Genteng (Genting), which consists of a group of buildings, on piles, on the reef, and is connected to the town of Sedanau on the island westward by a bridge. There is a Government pier, suitable for small vessels at Genteng, which can be identified by a small wooden cupola surmounted by a flag-staff. The village of Ajer Buluh, the residence of the Netherlands Administrative Officer, stands on the southern side of the inlet close to Sedanau. There is regular steamer communication with other ports in the Nederlandsch Oost-Indië.

A light is exhibited, at an elevation of 7 feet (2^{m}1), from the pier head at Genteng.

Chart 2140, plan of La Place strait.

Kembang, a double peaked islet, 390 feet (118^{m}9) high, lies on the south-western part of an extensive detached reef, about 3 miles north-north-eastward of Burung. Shoals, with depths of from 4½ to 6 fathoms (7^{m}8 to 11^{m}0) over them, lie within a distance of three-quarters of a mile of the southern end of this islet; the positions of these can best be seen on the chart.

A white beacon, surmounted by a ball, marks the northern end of a reef about 1½ miles north-westward of the southern extremity of Kembang, and a similar beacon marks the western edge of a reef about one mile north-eastward of the white beacon. A black beacon, surmounted by a truncated cone, marks the south-eastern side of a small detached reef about 8½ cables eastward of Tanjong Semulut.

Chart 2140, plan of Sedanau channels.

A small coral reef, which dries, lies about 3 cables eastward of Tanjong Batu Pandan, situated about half a mile east-north-eastward of Tanjong Semulut.

The channel between Sedanau and the coastal reef north-eastward is encumbered by reefs and shoals, the positions of which can best be seen on the chart.

Within the beacons described above, a channel, marked by beacons privately maintained, leads into Reede Genteng, but local knowledge is necessary.

Chart 2140, plan of La Place strait.

Kuala Bindjei.—Islands and dangers.—Beacons.—Buoy.—The entrance to Kuala Bindjei is encumbered by islets and shoals, amongst which a channel leads to an anchorage off Tanjong Blitung (*Lat. 3° 47′ N., Long. 108° 12′ E.*), the northern extremity of the peninsula which forms the southern side of the bay, situated about 10 miles eastward of Tanjong Semulut.

Semarung is a low islet lying near the outer edge of the coastal reef about 5 miles eastward of Tanjong Semulut; it has a low hillock near its northern point.

Serungus, an islet with two peaks, the northern of which rises to an elevation of 488 feet (148^{m}7), lies near the eastern end of a reef 2 cables north-westward of Semarung. Pasir is a small islet, lying near the eastern end of an extensive reef, about 3½ miles east-north-eastward of Serungus.

Charts 1348, 2660a, 1263.

Digitized by Google

Chart 2140, plan of La Place strait.

A white beacon, surmounted by a ball, stands on a small reef about 1½ miles south-westward of the northern extremity of Semarung. A black beacon, surmounted by a truncated cone, and a black buoy, mark detached reefs, situated, respectively, about one mile, and three-quarters of a mile west-south-westward from the same point.

A vessel with local knowledge, bound for Kuala Bindjei anchorage, should steer for the white beacon described above, in line with the northern peak of Serungus, bearing 041°, until within a quarter of a mile of the beacon, when she should steer northward until the black beacon is in line with the southern peak of Serungus, bearing about 050°, when she should keep on that alignment, and pass close south-eastward of the beacon, and of the black buoy, and proceed to the anchorage, keeping clear of the reefs.

Kuala Bindjei is formed by the confluence of the narrow Sungei Bindjei with the broader Sungei Penarik, which latter is only navigable by boats.

Bindjei village is situated about 2 miles up Sungei Bindjei; the only export of any importance is timber. The logs are sent out in lighters to vessels in Reede Bindjei, and also at the anchorage southward of Komang (page 58).

Charts, 2140, plan of Sedanau channels, 1348.

Islands and dangers northward and north-westward of Sedanau.—Djali (Jali), a small islet, covered with coconut trees, lies on a coral reef, about 1½ miles south-westward of Tanjong Belitung, from which it is separated by a narrow, shallow channel.

A reef, which dries, lies about 1¾ miles westward of Djali and there are depths of from 3 feet (0m9) to 1¼ fathoms (2m3) in the vicinity. *Chart 1348.*

Salor, a densely wooded island, about 6 miles westward of Tanjong Belitung, rises steeply from the sea to a prominent peak, 1,604 feet (488m9) high. A drying reef fringes this island except on its western side, and extends about 1½ miles south-south-eastward from it. Kokop, an islet covered with coconut trees, lies on this reef about one mile south-eastward of the southern extremity of the island.

Between Sedanau and Salor, and between the latter and Djali, there are several reefs and shoals, the positions of which can best be seen on the chart.

Sabangar reef, which dries, lies about 9 cables north-north-eastward of the north-eastern extremity of Salor.

Penganak, a low islet, and Batu Bilis, with twin peaks, 463 feet (141m1) high, lie on a reef about 2¾ miles north-eastward of Salor. A rock, which dries, lies about 2 cables southward of the south-western point of Batu Bilis. The channel south-eastward and eastward of these islets is encumbered by shoals.

Melangi and Pisang are islets situated on the coastal reef about 2 miles east-south-eastward and 1¾ miles north-eastward, respectively, of Batu Bilis; the former is low and covered with coconut trees; the latter is hilly and wooded.

Two coral shoals, each with a least depth of 2 fathoms (3m7) over it, lie about 7 and 8¼ miles, respectively, west-north-westward of the northern point of Salor (*Lat. 3° 54′ N., Long. 107° 55′ E.*); a 2½-fathom (4m6) shoal lies about 3 miles north-north-westward of the same point. None of these shoals is marked by discoloration.

Charts 2660a, 1263.

Digitized by Google

Chart 1348.

Semama is a wooded sandy cay, lying on a reef about 2 miles northward of Batu Bilis.

Outlying danger.—Tokong Boro, a group of four boulders close together, is situated on a reef about 29 miles west-north-westward of Salor; the two highest boulders are about 9 feet (2m7) high.

Coast. — Islands and dangers. — Tanjong Pajung (Payung) (page 60) is the rocky extremity of a promontory on which there are three hills; Pajung (Payung) berg, about half a mile from the point, is the highest, and rises to an elevation of 630 feet (192m0). Derian, a ridge, 591 feet (180m1) high, and Sebung, 394 feet (120m1) high, and cone shaped, lie, respectively, about 2¾ miles east-south-eastward, and the same distance eastward of Tanjong Pajung.

Between Tanjong Pajung and Tanjong Semut, the northern extremity of Groot Natuna, about 20½ miles north-eastward, the coast is low and densely covered with vegetation; it is fringed by a reef which extends in places as much as 1¼ miles offshore.

Sabai is a hilly, wooded islet, about half a mile west-north-westward of Tanjong Pajung, from which it is separated by a narrow channel, with a least depth of 4 fathoms (7m3) in the fairway. Kapala Nanggal, a small rocky islet, lies on the edge of the reef, close north-westward of Sabai. A patch, with a least depth of 3¼ fathoms (5m9) over it, lies about three-quarters of a mile northward of Kapala Nanggal.

A reef, above water, lies near the northern end of a shoal, with depths of less than 5 fathoms (9m1) over it, about 2 miles offshore and 3½ miles north-eastward of Kapala Nanggal; a small reef lies about one mile west-south-westward, and a patch, with a depth of three-quarters of a fathom (1m4) over it, close westward of this reef.

Buton and Samarago are low islets fringed with a reef and covered with coconut trees, situated about 1¼ miles and 3½ miles, respectively, north-westward of Tanjong Papak, which latter lies about 5¼ miles north-eastward of Tanjong Pajung. A detached reef lies about 3½ cables north-westward of Buton, and a rock, with a depth of less than 6 feet (1m8) over it, lies about 3 cables west-south-westward of Samarago.

Bunga, about 1½ miles offshore, and 7 miles north-eastward of Buton, is a low islet covered with coconut trees, lying on a reef. Several shoals, with depths of from 2 to 4¾ fathoms (3m7 to 8m7) over them, and a reef lie within 4 miles south-westward of Bunga. A 2½-fathom (4m6) patch lies about 7 cables northward of Bunga.

Between Bunga and Pandjang (Panjang), about 6½ miles north-eastward, there are several shoals, with depths of from less than 6 feet (1m8) to 5 fathoms (9m1) over them, lying as much as 2½ miles offshore. A 3¼-fathom (5m9) patch, not marked by discoloration, lies about 2¼ miles northward of Bunga and 3¼ miles offshore.

Chart 2140, plan of Panjang strait.

Tanjong Semut (*Lat. 4° 14′ N., Long. 108° 13′ E.*) is a low flat point from which the coastal reef extends about three-quarters of a mile northward. There is a Chinese store close to the point. Panda, a small islet, 43 feet (13m1) high near its northern end, which is much eroded by the sea, lies on the outer edge of the reef about 3½ cables northward of the point.

Pandjang lies with Tanjong Ju, its south-western extremity, about 2 miles westward of Tanjong Semut, from which it is separated by

Digitized by Google

Chart 2140, plan of Panjang strait.

Straat Panjang (page 65). The northern part of the island is hilly; Tanjong Kapala Pandjang (Panjang), the north-eastern extremity, is a steep and rocky point, eroded by the sea, rising to an elevation of 167 feet (50^{m}9). The island has sandy beaches and is fringed by a reef which extends as much as 6 cables from its eastern side.

Chart 1348.

Off-lying islands and dangers.—Sedua, an island, lies about 4 miles west-north-westward of Tanjong Pajung; it is low and sandy near its southern end, on which there are coconut trees; the northern part of the island is bold and rugged and rises to an elevation of 276 feet (84^{m}1). Selimu, an island, 369 feet (112^{m}5) high, and rugged except on its southern side, lies about half a mile eastward of Sedua. Both these islands are fringed by reefs, which are separated by a narrow channel.

A 2-fathom (3^{m}7) patch lies about 1½ miles southward of Sedua and a coral shoal, with a least depth of 1¼ fathoms (2^{m}3) over it, which is not marked by discoloration, lies about 4 miles westward of the same island.

Seluan, about 5½ miles north-westward of Sedua, is a hilly wooded island, 984 feet (299^{m}9) high. The south-western extremity of the island is the termination of a small peninsula connected to the island by a lower neck; when seen from north-westward it appears as an islet. A rock, which dries, and on which the sea generally breaks, lies about 4 cables eastward of the southern part of the island, and a sunken rock lies about 3 cables off its eastern side, about one mile southward of the north-eastern extremity.

A coral reef, with a least depth of 2 fathoms (3^{m}7) over it, lies with its southern end about 2 miles west-north-westward of the southern extremity of Seluan, from which it is separated by a deep, clear passage. The southern extremity of Seluan in line with Bedung (Bedong) (page 67), a mountain situated about 15 miles eastward of Tanjong Pajung, bearing about 104°, leads close southward of this reef.

Semapi reef, which dries in places, lies on the north-western side of Favorite passage, with its south-western extremity about 8 miles eastward of the northern end of Seluan. A 5½-fathom (10^{m}1) patch lies about 1¼ miles southward of the south-western extremity of Semapi reef, and a 3½-fathom (6^{m}4) patch lies midway between them.

A 5-fathom (9^{m}1) patch and a 5½-fathom (10^{m}1) patch lie half a mile south-westward and three-quarters of a mile south-eastward, respectively, of the south-western extremity of the same reef.

A reef, with a least depth of 1½ fathoms (2^{m}7) over it, lies about 3¼ miles north-north-westward of Semapi reef.

Karang Bunta, consisting of two coral reefs separated by a narrow and deep channel, lies about 12 miles north-north-eastward of Seluan; the southern reef has a least depth of 6 feet (1^{m}8) over it, and is marked by discoloration; the northern reef dries in places.

Favorite passage.—Dangers.—This passage, in which there is a least depth of 9 fathoms (16^{m}5) in the fairway, leads between Semapi reef on its north-western side and the dangers off-lying the north-western coast of Groot Natuna on its south-eastern side.

A drying reef, which, when covered, is marked by discoloration, lies on the southern side of the western entrance to Favorite passage about 2 miles north-eastward of Samarago (*Lat. 4° 06′ N., Long.*

Charts 2660a, 1263.

Digitized by Google

Chart 1348.

108° 00′ E.). For the 3¼-fathom (5m9) patch about 7 miles farther north-eastward, *see* page 64.

Chart 2140, plan of Panjang strait.

Straat Pandjang.—Dangers.—Straat Pandjang (Panjang), the narrow channel between the reefs fringing Pandjang, and the coastal reef at the northern end of Groot Natuna, is clear of dangers, the reefs on either side being marked by discoloration. On the north-western side of the south-western end of the strait, a spit, with depths of less than 5 fathoms (9m1) over it, and 2 fathoms (3m7) at its outer end, extends about one mile south-westward from Tanjong Ju. The shoals farther south-westward are described on page 63.

Directions.—Approaching Straat Pandjang from Favorite passage a vessel should steer for the wooded hill, 364 feet (110m9) high, on Tanjong Datu, situated about 1½ miles south-eastward of Tanjong Semut, bearing 090°, until Tanjong Ju bears 022°, when she should steer 040°, with the southern extremity of the island a little on the port bow, until close to the point, when she should steer about 056°, through the middle of the channel.

From northward or eastward, the vessel should steer for the southern extremity of Pandjang (*Lat. 4° 14′ N., Long. 108° 12′ E.*), bearing 245°, until the southern extremity of Panda is in line with Tanjong Datu, bearing about 128°, when she should alter course to 237°. When the southern extremity of Pandjang bears 315° she should steer 220° until the wooded hill on Tanjong Datu bears 090°, when she should keep it on that bearing, astern, while passing between the shoals in the western entrance.

Chart 1348.

South-eastern side of Groot Natuna.—Islets and dangers.—Between Tanjong Pian Padang (page 60) and Tanjong Sebintang, about 9½ miles north-eastward, the south-eastern coast of Groot Natuna forms a bight, near the head of which, about 5½ miles north-north-eastward of the former point, is Tanjong Medang, from which a reef extends one mile south-eastward. Between Tanjong Sebintang and Tanjong Kukup, about 4¼ miles north-north-eastward, the coast is low and sandy, and covered with coconut trees; except near the southern end of the island the country inland is also low. In clear weather the peak of Salor (page 62) is visible over the intervening low land.

With the exception of a stretch, about 2 miles in length, close south-westward of Tanjong Medang, this part of the coast is fringed by a reef. Foul ground extends about 5 miles north-eastward of Tanjong Pian Padang (*Lat. 3° 40′ N., Long. 108° 18′ E.*), and about 2½ miles offshore.

The villages of Pandang and Penarik are situated, respectively, about 1¾ miles and 4 miles north-north-eastward of Tanjong Pian Padang. There is anchorage for vessels with local knowledge off the latter village; the dangers in the approach to this anchorage are marked by discoloration.

A reef, parts of which are above water, lies about 3 miles eastward of Tanjong Medang; a reef, with a least depth of about one foot (0m3) over it, lies about 1¼ miles south-eastward, and another, above water, 1¾ miles eastward of its south-eastern extremity.

Djantai (Jantai) and Kemudi, situated, respectively, 1½ miles southward, and the same distance eastward of Tanjong Sebintang, are low

Digitized by Google

Chart 1348.

islets covered with coconut trees; both these islets are fringed with reefs, and reefs and foul ground extend about 1¾ miles east-north-eastward from the latter. A 1¼-fathom (2m3) patch lies about 2¼ miles east-north-eastward of Kemudi. There is no passage between these islets and the coastal reef westward of them.

White rock, situated on the outer edge of the coastal reef, about 2 miles northward of Kemudi, is prominent in certain lights.

A Chinese store, with a prominent roof, is situated near the head of a cove in the reef, about midway between Tanjong Sebintang and Tanjong Kukup; there is good landing for boats here.

Tanjong Kukup is a low point, which can be identified by the coconut trees with which it is covered. The coastal reef, on which is a low islet, situated about 2 cables east-north-eastward of the point, extends about 1½ miles east-north-eastward of Tanjong Kukup.

Off-lying dangers.—Lamina reef, with a least depth of a quarter of a fathom (0m5) over it, lies about 4¼ miles eastward of Tanjong Pian Padang.

Penungul reefs are the easternmost of the known dangers off this coast; Devonport reef, the southernmost of these reefs, with a least depth of 2¼ fathoms (4m1) over it, lies about 5 miles eastward of Tanjong Kukup; the northernmost reef, with a least depth of 2 fathoms (3m7) over it, lies about 2¾ miles northward of Devonport reef. There are two shoals, with depths of 3½ and 4 fathoms (6m4 and 7m3) over them, lying between Penungul reefs and the 10-fathom (18m3) line, about 3¼ miles east-north-eastward and the same distance eastward, respectively, of Tanjong Kukup.

In addition to the dangers described above there are numerous others, within the 10-fathom (18m3) line, between Tanjong Pian Padang and Tanjong Kukup; the positions of these can best be seen on the chart.

Anchorage.—Directions.—There is anchorage for vessels with local knowledge, in depths of 4 fathoms (7m3), about 7½ cables south-south-eastward of the Chinese store standing midway between Tanjong Sebintang and Tanjong Kukup.

A vessel approaching this anchorage should steer for the store, bearing 282°, until Kemudi comes in line with the south-eastern peak of Pian Padang hill, bearing about 223°, when she should steer 259° and anchor when the store bears 332°. There is a rock, with a depth of less than 6 feet (1m8) over it, about 2¾ cables northward of this anchorage.

Sungei Ulu.—Beacons.—Sungei Ulu discharges between Tanjong Karang, a barren point, about 1¾ miles northward of Tanjong Kukup, and Tanjong Pasir, about 1¼ miles west-north-westward. Setegas, 584 feet (178m0) high, rises close southward of the river, about 4 miles west-south-westward of Tanjong Pasir (*Lat. 3° 54′ N., Long. 108° 24′ E.*). The entrance, about 3 miles eastward of Tanjong Pasir, is between the coastal reefs, which here extend 1¾ miles eastward from Tanjong Karang, and 2½ miles eastward from Tanjong Pasir; the sea breaks on the latter reef; the entrance is marked on its southern side by a white beacon, surmounted by a ball, and on its northern side by a black beacon, surmounted by a truncated cone, but it can only be entered by vessels with local knowledge.

From the entrance the channel trends westward between drying reefs to a position about 6 cables northward of Tanjong Karang, and

Digitized by Google

Chart 1348.

thence west-south-westward to about 3 cables southward of Tanjong Pasir. *See* view facing page 59.

A Chinese store stands on the reef on the northern side of the channel about 2 cables south-south-westward of Tanjong Pasir; it is connected to the land northward by a bridge. Vessels drawing 12 feet (3m7) can proceed as far as this store at low water, but the channel in the vicinity is less than one cable wide; above this point the river ceases to be navigable, even by boats.

There is good anchorage, in a depth of 11 fathoms (20m1), off the entrance to the river.

A vessel entering should keep the saddle southward of Setegas in line with the cone beacon, bearing 256°, which leads close to the reefs on either side, and thence be guided by the beacons inside.

North-eastern side of Groot Natuna.—Aspect.—Between Tanjong Pasir and Tanjong Senubing, about 4 miles northward, and thence to Tanjong Datu, about 18 miles north-westward, the coast is generally low and rises gradually towards the mountains inland, the most prominent being Ranai gebergte and Bedung (Bedong).

Ranai gebergte consists of a short steep ridge on which are three peaks, the southernmost of which, situated about 4½ miles north-westward of Tanjong Pasir, is a prominent square mass of rock, 3,166 feet (965m0) high. The northernmost peak, about one mile northward, rises to an elevation of 3,396 feet (1,035m1). Bedung, 7½ miles west-north-westward of the northernmost peak of Ranai gebergte, is 1,432 feet (436m5) high; it is steep on its north-eastern side and slopes gradually south-westward.

Chart 2140, plan of Telok Ranai.

Telok Ranai.—Dangers.—Telok Ranai, entered between the northern side of the reef, which extends about 2 miles north-eastward from the coast northward of Tanjong Pasir, and Tanjong Senubing, is open north-eastward and is only suitable as a temporary anchorage. Tanjong Senubing is a prominent point formed by Senubing, a hill which rises about a quarter of a mile inland, to an elevation of 320 feet (97m5). The shores of the bay are covered with coconut trees, amongst which are scattered houses. Landing is possible at high water by boats which can cross the reef at Ranai village, about 1½ miles south-south-westward of Tanjong Senubing; at low water the only landing place is an indentation of the reef near the head of the bay.

A 3¼-fathom (5m9) patch and a 4¼-fathom (7m8) patch lie about 6 cables south-eastward and the same distance southward, respectively, of the southern end of Tanjong Senubing. A rock, with a depth of 3 feet (0m9) over it, lies close to the outer edge of the reef about one mile southward of the same point, and two rocks, each with a depth of less than 6 feet (1m8) over it, lie about 5 cables eastward and 6½ cables east-south-eastward, respectively, of Ranai village.

Anchorage.—Directions.—There is temporary anchorage eastward of Ranai village, with the hill on Tanjong Senubing (*Lat. 3° 58′ N., Long. 108° 24′ E.*), bearing 000°.

A vessel from southward should steer for the hill on Tanjong Senubing, bearing 308°, until Tanjong Pasir bears 212°, and two prominent houses in the middle of Ranai village bear 256°; thence she should steer for the anchorage, keeping the prominent houses bearing less than 265° until westward of the rock, with a depth of 3 feet (0m9) over

Digitized by Google

Chart 2140, plan of Telok Ranai.

it, lying close off the reef on the southern side of the bay. A small vessel proceeding farther in should steer about 202° from the outer anchorage, taking care to keep Tanjong Senubing open westward of the western side of Senua (*see* below), to avoid the two sunken rocks east-south-eastward of Ranai village.

Charts 2140, plan of Telok Ranai, 1348.

From northward the vessel should steer for Tanjong Pasir, bearing 209°, until the two prominent houses bear 256°, whence she should proceed as directed above.

Coast.—Island.—Dangers.—Tanjong Tandjung (Tanjung) is a low point about 4½ miles north-westward of Tanjong Senubing; between them the coastal reef extends as much as 4 cables offshore.

Senua, an island, about 2½ miles north-north-eastward of Tanjong Senubing, can be identified by its three summits, the highest of which attains an elevation of 377 feet (114m9), and by Penganak Senua, a rock, 17 feet (5m2) high, lying close off its south-eastern end. The eastern side of the island is steep-to and rugged; the southern and western sides are low and sandy, and from them a reef extends as much as 3½ cables offshore.

A shoal, with a least depth of one fathom (1m8) over it, lies close off the reef, about 4 cables westward of Senua; two small patches, each with a least depth of 3 fathoms (5m5) over it, lie, respectively, about 2 and 4½ cables farther in the same direction.

Straat Senua, which separates Senua from the coast of Groot Natuna south-westward, is encumbered by shoals, with depths of from about one foot to 5 fathoms (0m3 to 9m1), the positions of which can best be seen on the chart; it is navigable only by small vessels with local knowledge.

Anchorage.—Directions.—Telok Selahang, an inlet in the coastal reef south-eastward of Tanjong Tandjung (*Lat. 4° 01′ N., Long. 108° 21′ E.*), affords good anchorage for small vessels with local knowledge, in depths of from 4 to 5 fathoms (7m3 to 9m1), about 6½ cables south-eastward of that point. A vessel proceeding to this anchorage should do so through Straat Senua, with Tanjong Senubing astern, bearing 165°. When the northern end of Senua bears 088° she should alter course westward and keep on this bearing, astern, until Tanjong Senubing bears 142°, when she should steer 248° for the foot of the northern spur of Ranai gebergte, which leads to the anchorage.

Chart 1348.

Off-lying danger.—De Mieulle reef, which dries near its centre, lies about 3¾ miles north-eastward of Senua; the channel between them is deep and clear.

Coast.—Dangers.—Between Tanjong Tandjung and Tanjong Pengedak, which is low and sandy, about 5 miles north-westward, the coast is fringed by a reef, and foul ground extends as much as 2¼ miles offshore. Sahi, a prominent rock, lies on the coastal reef about 1¼ miles southward of Tanjong Pengedak.

Between Tanjong Pengedak and Tanjong Datu the coast forms a bight, the southern part of which is named Telok Sengiap, and the northern part Telok Muara. This part of the coast is low and sandy.

Telok Sengiap, which affords safe anchorage, is free from fringing reef, and has a sandy beach; a 3½-fathom (6m4) patch lies near the eastern side of the entrance about one mile northward of Tanjong Pengedak.

Charts 2660a, 1263.

Digitized by Google

Chart 1348.

Between Telok Sengiap and Tanjong Datu the coast is fringed by a reef, and there are numerous shoals with depths of less than 3 fathoms (5m5) over them, extending 1½ miles offshore. Vessels are recommended to avoid closing this part of the coast within depths of 12 fathoms (21m9).

About 2½ miles southward of Tanjong Datu there are several red coloured rocks close to the coast.

Chart 2140, plan of Panjang strait.

Tanjong Datu is a sheer, barren, steep-to cliff, with a wooded summit rising from the sea to an elevation of 364 feet (110m9).

Telok Ajer Litjin (Ayer Lichin) is a small bay, lying between Tanjong Datu and Tanjong Semut; it is encumbered by reefs through which a small stream discharges.

Chart 1348.

Noord Natuna eilanden.—Dangers.—Noord (North) Natuna eilanden are of little importance to shipping. They are under the rule of a native chief, with the title of Datuk, who resides on Laut.

Tokong Burung, the south-westernmost of the group, lies about 19 miles north-westward of Seluan (page 64); it consists of a rock, 13 feet (4m0) high, lying on a small reef.

Semiun, about 6 miles north-north-eastward of Tokong Burung, is a small, rugged island on which there are three hills, the westernmost of which rises to an elevation of 497 feet (151m5). The coast is precipitous except on the eastern side of the island, where there is a sandy beach. The island is fringed by a steep-to drying reef. A 2¼-fathom (4m1) coral patch lies about one mile south-south-westward and another, with a least depth of 5 fathoms (9m1) over it, about 1½ miles northward of the island.

Chart 2140, plan of Pulau Laut.

Laut or Noord Natuna eiland lies about 15 miles north-eastward of Semiun; it is hilly, rising near its northern end to an elevation of 896 feet (273m1). The coast, except near the northern end of the island, is low and sandy. The villages of Parit and Tongkok are situated about one mile north-north-eastward and 1½ miles east-south-eastward, respectively, of Tanjong Majam, the south-western extremity of the island. The island is fringed by an extensive reef which extends about 3 miles westward from Tanjong Majam (*Lat. 4° 41′ N., Long. 107° 56′ E.*), and as much as 2¾ miles from its eastern side.

Batu Imung, a detached rock, 58 feet (17m7) high, lies about three-quarters of a mile off the edge of the reef, and 4¼ miles south-eastward of Tanjong Majam.

Doris reef, with a least depth of 1½ fathoms (2m7) over it, lies close off the edge of the reef about 2¾ miles north-eastward of Batu Imung.

Sengat and Sebetul, two rocks, lie on the southern part of the reef about 2¾ miles east-south-eastward, and three-quarters of a mile north-north-westward, respectively, of Tanjong Majam. A group of rocks, above water, lie about 6 cables north-eastward of Sebetul.

Sekatung, a precipitous hilly islet, 731 feet (222m8) high, lies on the reef, about 3 cables north-north-eastward of Laut; a bare, detached rock, 223 feet (68m0) high, lies at its north-eastern extremity.

Glamis Castle rock, with a least depth of 1½ fathoms (2m7) over it, lies close off the edge of the reef, about 3 miles south-eastward of the northern extremity of Laut.

Charts 2660a, 1263.

Digitized by Google

Chart 2140, plan of Pulau Laut.

In addition to the dangers described above, there are numerous dangers outside the coastal reef, and within depths of 10 fathoms (18m3); the positions of these can best be seen on the chart.

Off-lying dangers.—A reef, with a least depth of 3½ fathoms (6m4) over it, coral, lies about 5¾ miles south-south-eastward of Batu Imung.

Karang Kia, with a least depth of 3½ fathoms (6m4) over it, coral, and Gloria reef, with a least depth of 1½ fathoms (2m7) over it, coral, lie, respectively, about 4¼ miles south-south-eastward, and 2½ miles southward of Batu Imung; a 3½-fathom (6m4) patch lies about half a mile westward of Gloria reef.

Karang Tuman, with a least depth of 3½ fathoms (6m4) over it, coral, and Batu Penu, with a least depth of 2¾ fathoms (5m0) over it, coral, lie, respectively, about 5½ miles south-eastward, and the same distance east-south-eastward of Batu Imung.

A shoal, with a least depth of 4½ fathoms (8m2) over it, coral, lies about 6 miles south-eastward of the northern extremity of Laut.

A 5-fathom (9m1) patch lies about 1¼ miles from the western side of Laut, 3¼ miles west-south-westward from its northern extremity.

Chart 1348.

Laurel reef, with a least depth of 7 fathoms (12m8) over it, coral, lies about 8 miles east-south-eastward of the northern extremity of Laut; a 6-fathom (11m0) patch lies about 2¼ miles west-south-westward of Laurel reef.

Chart 2140, plan of Pulau Laut.

Anchorages.—Directions.—During the North-east monsoon there is anchorage, in depths of from 12 to 14 fathoms (21m9 to 25m6), off the coastal reef at the southern end of Laut, with the south-eastern extremity of the island bearing 043°, and Batu Imung (*Lat. 4° 38′ N., Long. 107° 59′ E.*) bearing 108°. Vessels can also anchor, in a depth of about 8 fathoms (14m6), inshore of the detached reefs close southward of the island.

During the South-west monsoon there is good anchorage, in depths of from 10 to 12 fathoms (18m3 to 21m9), with the north-western extremity of Sekatung bearing 064°, and the northern extremity of Laut bearing 133°, or, in depths of from 9 to 10 fathoms (16m5 to 18m3), with the summit of Sekatung bearing 270°, distant between 6 cables and 1½ miles.

If proceeding to the inner anchorage off the southern side of Laut, a vessel should steer for the south-eastern extremity of that island, bearing 043°, which leads between the reefs in the entrance, until Batu Imung bears 125°, when she should alter course gradually north-westward to keep that islet astern, bearing 134°, and anchor when the south-eastern extremity of Laut bears about 082°.

A vessel may also approach this anchorage by steering for Sengat, bearing 027°, just open eastward of the eastern side of Laut, until Batu Imung bears 125°, and then proceed as directed above.

Charts 2660a, 1263.

Digitized by Google

CHAPTER III

WEST COAST OF BORNEO: PADANG TIKAR TO TANJONG DATU—TOGETHER WITH API PASSAGE

Charts 941a, 2660a.

WEST COAST OF BORNEO.—For Sungei Padang Tikar and the West coast of Borneo southward of it, *see* Eastern Archipelago Pilot, Vol. IV.

The coast between Tanjong Burung (*Lat. 0° 35′ S., Long. 109° 10′ E.*), the northern entrance point of Sungei Padang Tikar, and Tanjong Bangkai, about 58 miles north-north-westward, is low, swampy and densely wooded. Inland there are a few prominent detached hills, which, together with the mouths of the rivers, form the only landmarks.

Climate and weather.—*See* page 22.

Chart 3721.

Aspect.—Radak, 669 feet (203^{m}9) high, is an isolated flat-topped hill, situated about 16 miles eastward of Tanjong Burung. Terdjun (Terdjoen), about 3½ miles west-south-westward of Radak, is 246 feet (75^{m}0) high, and surmounted by two prominent trees. Ambawang gebergte, about 14 miles north-north-eastward of Tanjong Burung, has three peaks, of which the highest, Batu Wangkang, has an elevation of 1,476 feet (449^{m}9).

Chart 3720.

Lontjit (Lonchit), 1,539 feet (469^{m}1) high, and Raja, 2,015 feet (614^{m}2) high, lie about 16½ and 19 miles, respectively, eastward of Tanjong Bangkai.

Charts 941a. 2660a.

Outlying island and dangers.—A shoal, with a least depth of 3¼ fathoms (5^{m}9), over it, was reported, in 1919, to lie about 60 miles westward of Tanjong Burung.

Charts 3720, 3721.

Datu, about 22 miles south-westward of Tanjong Bangkai, is a wooded island, rising to two peaks, the higher of which attains an elevation of 1,001 feet (305^{m}1); when seen from west-south-westward or east-north-eastward it appears cone-shaped. The island is steep-to, except in a few places where there is a narrow coastal reef, and it affords no shelter; it is uninhabited.

A shoal, with a least depth of 4 fathoms (7^{m}3) over it, sand and mud, lies about 8½ miles southward of Datu.

Chart 3721.

Coast.—Beacons.—Sungei Ambawang, one of the mouths of Groote Kapuas rivier, is entered close northward of Tanjong Bunga

Digitized by Google

Chart 3721.

(Boenga) (*Lat. 0° 21′ S., Long. 109° 07′ E.*), which lies about 14 miles north-north-westward of Tanjong Burung; its mouth is closed by a bar, and its lower reaches are shoal. A white wooden beacon, surmounted by a ball, marks the junction of this river with Sungei Kubu (Koeboe), about 18 miles east-south-eastward of Tanjong Bunga.

Between Tanjong Putus (Poetoes), about 4½ miles north-north-westward of Tanjong Bunga, and Tanjong Saleh, about 14 miles north-north-eastward, the coast is fronted by several islands which form the delta of Sungei Pungur (Poengoer) besar, a continuation of Groote Kapuas rivier. The lower reaches of this river are too shoal to be of use for navigation. A white wooden beacon, surmounted by a ball, marks the junction of this river with Sungei Kubu near Tanjong Olak Olak, about 19 miles eastward of Tanjong Bunga.

Charts 3720, 3721.

Reede Pontianak.—Anchorage.—Reede Pontianak is the name given to the anchorage off the entrance to Kleine Kapuas rivier. *See* view facing this page.

Anchorage in the roadstead is open to the prevailing winds, and owing to the outflow from the river, vessels always lie with the wind and sea on their beam. Vessels should anchor in depths of not less than 11 fathoms (20^{m}1), in which depth the ground swell is less felt than closer in. During the North-west monsoon vessels should anchor still farther out, but at this period of the year it is often impossible for boats to enter the river.

Kleine Kapuas rivier. — Islands. — Shoal. — Buoy. — Kleine Kapuas (Kapoeas) rivier, one of the branches of the delta of Groote Kapuas rivier, is entered between the point about 6 miles north-north-eastward of Tanjong Saleh, and a point about 2½ miles northward; the entrance is fronted by a bar of soft mud which extends about 5 miles offshore through which a channel has been dredged, with a least depth, in 1949, of about 8 feet (2^{m}4). Between the bar and the town of Pontianak, about 10 miles above the southern entrance point, there is a least depth in the fairway of 20 feet (6^{m}1).

Pandjang (Panjang), an island, lies on the southern side of the entrance to the river from which it is separated by Selat Bantan; close off the northern side of Pandjang is Duwit and close off the eastern end are the islets of Babi Bumin, Baharu and another small islet, westward of these.

Batu Lajang is a small rock situated close off the northern side of the river about 4 miles east-south-eastward of the eastern end of Pandjang.

In 1939, a stony spit, with a depth of 2½ feet (0^{m}8) over it, extended from the northern bank of the river to about mid-channel at a position about one cable eastward of Batu Lajang; the southern edge of the spit was marked by a black can buoy fitted with reflectors.

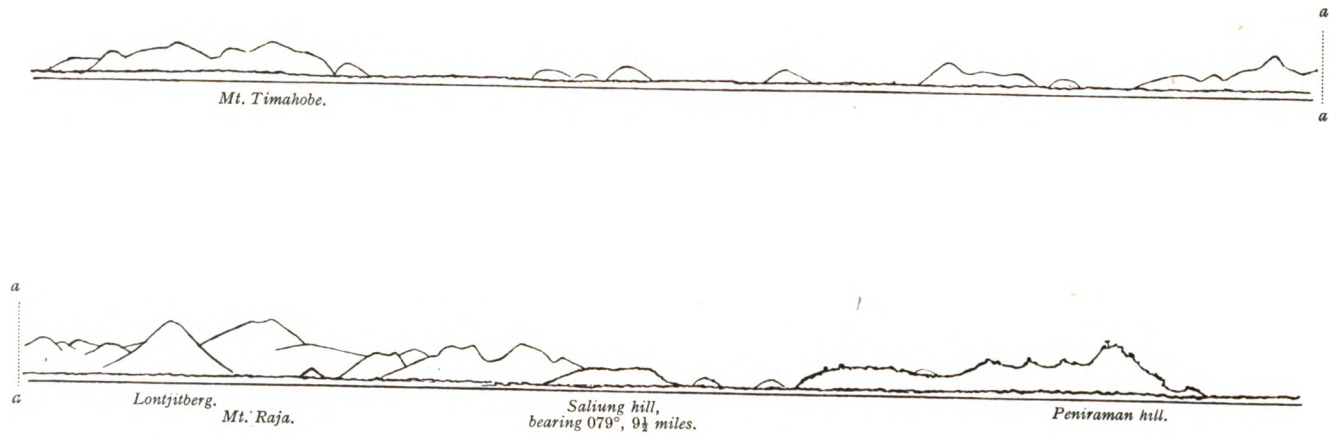
Lights.—Beacons.—From its entrance about 5½ miles north-westward of the southern entrance point, the dredged channel is marked on its southern side by three white beacons, and on its northern side by three black beacons. A light is exhibited, at an elevation of 40 feet (12^{m}2), from the outer beacon, 26 feet (7^{m}9) in height, on the southern side, and another light is exhibited, at an elevation of 17 feet (5^{m}2), from the inner beacon on the same side. The outer and inner beacons on the northern side are each fitted with a reflector.

Three iron beacons, situated from half a mile to 1¼ miles north-east-

To face page 72.

Digitized by Google

To face page 72.

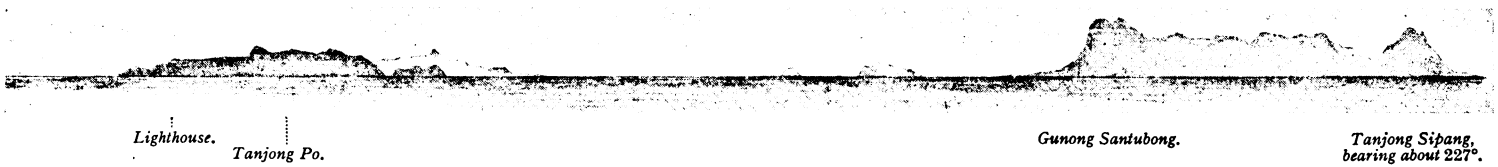


View, in two parts, of the northern approach to Reede Pontianak.

(*Original dated* 1929.)

Digitized by Google

To face page .



Approach to Sungei Saráwak from north-eastward.

(*Original dated prior to* 1912.)

Digitized by Google

Charts 3720, 3721.

ward of the dredged channel, are no longer used for purposes of navigation.

A beacon, surmounted by a white cone, stands on the northern side of the dredged channel, about 4 cables north-north-eastward of the front leading light-beacon.

Leading lights are exhibited, from two white iron beacons, east-south-eastward of the eastern pair of beacons marking the dredged channel; the front light is exhibited, at an elevation of 13 feet (4^m0); the rear light, 26 feet (7^m9) in height, is exhibited, at an elevation of 36 feet (11^m0) and situated about 2 miles northward of the southern entrance point (*Lat. 0° 02′ N., Long. 109° 11′ E.*). These beacons in line, bearing 114°, lead between the beacons marking the sides of the dredged channel.

A beacon, with a notice board on which is painted "Oversteken," (cross-over), is situated on the northern side of the river about $1\frac{1}{4}$ miles west-north-westward of Batu Lajang.

A beacon, with a notice board on which is painted "Wal Houden" (hug this shore), is situated on the southern side of the river about 4 cables south-westward of Batu Lajang; a similar beacon, on which is painted "Al Klaar" (all clear), is situated about 9 cables east-south-eastward of that islet.

The channel in the vicinity of Batu Lajang is also marked by several beacons.

Lights are exhibited at the Custom station at Djunkat (Junkat), on the northern side of the entrance about 2 miles north-eastward of the southern entrance point; from the beacon marked "Oversteken" on the northern side, and from the beacon marked "Wal Houden" on the southern side of the river.

Caution.—Much driftwood is carried off during the west monsoon and large pieces from the river banks, held together by thick growth, form floating islets, which are encountered in the open sea as far as Straat Karimata, about 170 miles southward.

Directions.—Anchorage.—A vessel approaching Reede Pontianak from southward should steer for the tallest tree on Peniraman heuvels, situated about 15 miles south-eastward of Tanjong Bangkai, in line with Lontjit, bearing 025°, which leads about $2\frac{1}{2}$ miles north-westward of the outer beacons.

From westward, after passing Datu, the vessel should steer for the outer beacons and enter the channel on the alignment of the leading light-beacons. There is no difficulty in making Reede Pontianak at night, but soundings should be frequently taken.

Before proceeding in or out, a vessel should ascertain that the channel over the bar is clear, as two vessels cannot pass each other; out-going vessels take precedence over in-going vessels.

A vessel with local knowledge proceeding to the anchorage off Pontianak, should keep the leading light-beacons in line, bearing 114°, but after passing the easternmost beacon on the northern side of the channel, should alter course slightly northward and keep the beacons on that side of the channel in line astern, and continue on this alignment until past the rear leading light-beacon. Thence she should keep towards the northern side of the channel until the beacon on the northern shore, marked "Oversteken" (cross over) is reached; thence she should steer across the river to the beacon on the southern shore

Charts 941a, 2660a, 1263.

Digitized by Google

Charts 3720, 3721.

marked " Wal Houden " (hug this shore) ; thence keep about one cable off the southern bank, passing southward of the black can buoy marking the stony spit extending from the northern bank about one cable eastward of Batu Lajang, until the beacon on the southern bank marked " Al Klaar " (all clear) is abeam, whence she should keep in mid-channel to the anchorage, in depths of from 9 to 10 fathoms (16m5 to 18m3), abreast the town. There is room for vessels to swing in this anchorage, but they should keep well clear of the Government pier.

The limits of this anchorage are, on the west, the meridian of 109° 18′ 56″ E. and, on the east, the western limit of the prohibited anchorage north-westward of the entrance to Sungei Landak.

Prohibited anchorage.—Lights.—As telegraph cables cross the river, anchorage is prohibited in two areas, situated, respectively, close north-westward and south-eastward of the entrance to Sungei Landak, nearly opposite Pontianak town. The limits of each area are marked by a red triangular board, from which a *red* light is exhibited, situated at each corner of the area.

Pontianak.—Pontianak (*Lat. 0° 01′ S., Long. 109° 21′ E.*), the capital of Kalimantan Barat, and the residence of the Sultan of Pontianak, is situated at the confluence of Kleine Kapuas with Sungei Landak. The houses are built of wood, and stand on piles on swampy ground which covers at high tide. The European and Chinese quarters are situated on the southern side of the river, and the native quarter, in which the Sultan resides, stands on the point between the two rivers.

Piers.—Light.—There is a Government pier with a berth, 787 feet (239m9) long, with depths of from 4 to 13 feet (1m2 to 4m0) alongside, in 1949, available for sea-going vessels. There is a tide-gauge, with a flagstaff above it, on this pier. There are two piers, one 174 feet (53m0) long, with a depth of 9 feet (2m7) alongside, from which a light is exhibited, and the other 43 feet (13m1) long, with a depth of 8 feet (2m4) alongside. There is also a small pier, with a depth of 14 feet (4m3) alongside, on the north bank, about 1½ miles above Batu Lajang.

On the arrival of an aircraft, until after its departure, a red ball will be displayed from the flagstaff on the down-stream end of the Government pier.

Harbour facilities.—Coal, fuel oil and fresh provisions are obtainable ; water is scarce and of inferior quality ; it can be obtained when necessary from Sungei Melajoe, a small tributary of Sungei Landak.

There is a hospital at Pontianak.

There is a Government dry dock, situated on the northern side of the river ; for dimensions *see* Appendix I. Repairs can be carried out.

Trade.—The principal products are oil and coconuts.

Communications.—Pontianak is connected to the general telegraph system, and by telephone with Singkawang (page 80) ; there is also a local telephone service.

There is regular steamer communication with Batavia and Singapore and also with coastal ports. There is also steamer communication on the large rivers.

Pilots.—There is no official pilotage service.

Climatic table.—*See* page 38.

Tidal streams.—The out-going stream at Pontianak runs longer than the in-going, more especially at night, as a result of the land breeze ; it attains its maximum rate about 4 hours after high water

Digitized by Google

Charts 3720, 3721.

about November. The in-going stream reaches its maximum rate about April. During the west monsoon the in-going stream at Pontianak is scarcely perceptible; a slight slacking of the out-going stream is all that occurs, even at spring tides.

Chart 3721.

Upper river.—Beacon.—From Pontianak, Kleine Kapuas rivier trends south-eastward for about 28 miles to the village of Suka (Soeka) Lanting, where it joins Groote Kapuas rivier and Sungei Pungur (Poengoer) besar (page 72). The navigation of this part of the river presents no difficulty, with the exception of rather sharp turns off the village of Telok Kumpai (Koempai) and Tanjong Selebes, situated about 10 and 27 miles, respectively, above Pontianak, at both of which caution is necessary.

Between Pontianak and a position a little above the village of Telok Kumpai the river banks are low and marshy; above this point the banks have been largely cleared of forest and consist of paddy fields with small trees and brushwood. This part of the river is navigable by vessels drawing 10 feet (3^{m}0). A beacon, surmounted by a white ball, marks the junction of Groote and Kleine Kapuas rivieren.

Caution.—The lower reaches of Groote and Kleine Kapuas rivieren are subject to fierce squalls of wind and heavy rain storms; morning fogs are also frequent, and are so dense that all navigation is impossible during their continuance.

Groote Kapuas rivier.—Groote Kapuas (Kapoeas) rivier, the principal river of the west coast of Borneo, from its junction with Kleine Kapuas, trends generally eastward for about 620 miles.

The channel northward of Bengah (*Lat. 0° 22′ S., Long. 109° 37′ E.*), an island situated about 3 miles above Suka Lanting, was reported, in 1940, to have silted up. A bank, which dries, lies between Ketipu, an island situated about 35 miles above Bengah, and Separoh, westward of it.

Chart 941a.

At mean water level the river is navigable by vessels with local knowledge, drawing 10 feet (3^{m}0), as far as Sintang, about 254 miles above its mouth. With a good pilot from Pontianak a vessel drawing 12 feet (3^{m}7) can ascend as far as Tajan (Tayan), about 100 miles from the sea. Vessels drawing 7 feet (2^{m}1) can proceed as far as Selimbau, about 92 miles above Sintang; motor boats drawing 4 feet (1^{m}2) can reach Putus Sibao, 114 miles farther, above which the river is only practicable for native craft, which can proceed yet another 100 miles up-stream.

When the river is low, which only occurs about once in three years, the lower reaches are only navigable by vessels drawing less than 6 feet (1^{m}8). At these times the depths in the river between Selimbau (*Lat. 0° 38′ N., Long. 111° 58′ E.*) and Putus Sibao are as little as one foot (0^{m}3).

" High river " usually occurs in November, December and January; " Low river " in July, August and September. For the information of pilots depth gauges are established at Tajan, Sintang and Semitau.

The tidal stream is still perceptible at Tajan when the depth gauge there shows 1^{m}5 (5 feet). Between Tajan and Putus Sibao, the average rate of the current in the river is about 2 knots; at " High river " it attains a maximum rate of 4 knots in some places.

Charts 2660a, 1263.

Digitized by Google

Chart 941a.

Tajan is a Government establishment on an island off the mouth of Sungei Tajan. Meliau, about 13 miles above Tajan, is a small Malay and Chinese village. Sanggau, a small Malay and Chinese settlement, situated about 38 miles above Meliau, is the residence of a European Administrator. Sekadau, about 38 miles above Sanggau, is a small village, in which there is a rest-house. Sintang is the residence of an Administrator, and a military station.

Silat, about 56 miles above Sintang, is a small Malay village with a Chinese settlement. Semitau, the residence of a European Administrator, is a small Malay village, about 25 miles above Silat. Selimbau is a hamlet about 11 miles above Semitau ; there are coal mines in this vicinity. Putus Sibao is a small Malay village, and the residence of a European Administrator ; this is the highest Malay settlement on the river.

Charts 941a, 2660a.

Tributaries of Groote Kapuas rivier.—Sungei Tajan is navigable, at mean water level, by native craft, as far as the Chinese settlement of Bunan, about 63 miles from its mouth. Sosok, another Chinese settlement, is situated about 45 miles above Bunan. Heavy floods, of short duration, occur in the river after long periods of rain. At the low-river season the river is not navigable.

Charts 941a, 2660a, b.

Sungei Sekajan (Sekayan) enters Groote Kapuas near Sanggau (*Lat. 0° 13′ N., Long. 110° 39′ E.*) ; under normal conditions this river is navigable by native craft for about 72 miles.

Sungei Belitang discharges near the village of the same name, about 38 miles below Sintang. At mean level this river is navigable by native craft for about 50 miles, and by motor launches, drawing not more than 7 feet (2^m1), for about 20 miles ; at " high-river season " motor boats, drawing 6 feet (1^m8), can reach the village of Balai Sepuwah, about 40 miles above Belitang.

Sungei Melawi, the most important tributary of the middle reaches, joins Groote Kapuas rivier just below Sintang.

Charts 2660a, b.

At mean level, motor launches, drawing 7 feet (2^m1), can ascend this river as far as the village of Nangah Pinoh, about 50 miles above Sintang. At " high-river " fast motor launches, drawing 5 feet (1^m5), can occasionally ascend as far as Nangah Serawai, a Malay settlement 83 miles above Nangah Pinoh. After heavy rains floods occasionally occur which interrupt navigation for about 48 hours. After about a fortnight's drought Sungei Melawi ceases to be navigable even by small motor craft, and after a prolonged drought the entrance dries in most places, and its waters enter the main river with a fall.

Nangah Pinoh, a Malay village containing a Chinese settlement, is the residence of a European Administrator.

Charts 941a, 2660a, b.

Sungei Ketungau joins Groote Kapuas rivier about 30 miles above Sintang (*Lat. 0° 13′ N., Long. 111° 21′ E.*) ; it is navigable, at mean level, by craft drawing 4 feet (1^m2), for about 56 miles.

Sungei Tawang, the main outlet of the Great lakes, situated between Groote Kapuas rivier and Batang Lupar gebergte, flows into Groote Kapuas rivier about 110 miles above Sintang.

With the depth gauge at Selimbau village, situated about 7 miles

Digitized by Google

Charts 941a, 2660a, b.

farther up Groote Kapuas, showing 21 feet (6m4) above zero, it is possible for handy vessels, drawing 10 feet (3m0), to reach and navigate the lakes.

At periods of very " high river " the lake district becomes inundated, while after a period of prolonged drought the lakes dry up.

Chart 1263.

Sungei Bunut enters Groote Kapuas about 60 miles above Selimbau ; it is navigable at " high river," by motor launches, drawing 4 feet (1m2), for about 40 miles above the village of Bunut at its mouth.

Sungei Embeluh flows into Groote Kapuas near Nangah Embeluh, about 12 miles above Bunut. It is navigable during the " high river " period as far as Ulak Pauh, a Dyak village 75 miles above its mouth.

Sungei Mandai joins Groote Kapuas about 35 miles above Bunut ; at mean level this river is navigable by motor boats, drawing 4 feet (1m2), as far as Nangah Kalis, about 40 miles above its entrance.

Chart 3720.

Coast.—The coast between the northern entrance point of Kleine Kapuas rivier and Tanjong Bangkai, about 23 miles north-westward, is fringed by a bank, with depths of less than 5 fathoms (9m1) over it, extending as much as 6 miles offshore.

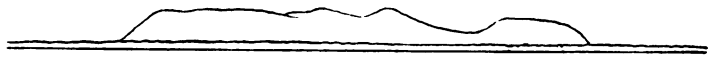
Sungei Mempawah is a small river which discharges about 3½ miles south-eastward of Tanjong Bangkai. Vessels drawing 5 feet (1m5) can ascend it at high water as far as the Chinese village of Mentidung, about 24 miles east-north-eastward of Tanjong Bangkai (*Lat. 0° 21′ N., Long. 108° 55′ E.*). The Malay village of Mempawah stands about 4 miles above the river entrance.

Tanjong Bangkai is a low, flat point, from which a bank, with depths of less than 5 fathoms (9m1) over it, extends about 1¾ miles westward.

Anchorage.—Vessels can anchor, in depths of from 5 to 8 fathoms (9m1 to 14m6), anywhere between the mouths of Kleine Kapuas and Mempawah rivieren.

Coast.—Aspect.—The coast between Tanjong Bangkai and Tanjong Batu Belat, about 29 miles northward, is low and densely wooded. The coastal bank, with depths of less than 3 fathoms (5m5) over it, extends as much as 2½ miles offshore.

The country inland is mountainous ; the most prominent mountains being Timahobe, 1,585 feet (483m1) high, situated about 17 miles north-eastward of Tanjong Bangkai ; Batu Baja, 1,145 feet (349m0) high, about 10 miles north-westward of Timahobe ; and Raja gebergte, about 10 miles eastward of Tanjong Batu Belat, which attains an elevation of 3,015 feet (919m0). Bawang, 4,729 feet (1,441m4) high (chart 941a), situated about 21 miles east-north-eastward of the summit of Raja gebergte is also prominent.



Timahobe, bearing 096°.
(*Original dated* 1929.)

Penibungan is an islet, 178 feet (54m2) high, lying in a bight in the coast about 3¾ miles north-north-eastward of Tanjong Bangkai. It was reported, in 1949, to be joined to the coast. Tanjong Sanggau,

Chart 1263.

Digitized by Google

Chart 3720.

9½ miles northward of Tanjong Bangkai, has a small hillock near its extremity which terminates in a low cliff; Kebangsi, 490 feet (149m3) high, and Bangkam, 507 feet (154m5) high, lie, respectively, about 2¼ miles eastward, and 3½ miles east-north-eastward of this point.

Tanjong Terandjun (Teranjun), about 13 miles northward of Tanjong Sanggau, is high and cliffy; Bunga, about half a mile inland, rises to an elevation of 637 feet (194m2). Keran, a high rock, lies close to the southern side of this point.

Semesa, 358 feet (109m1) high, and Tempurung, 95 feet (29m0) high, both of which are densely wooded, are islands lying about half a mile westward of Tanjong Terandjun.

Tanjong Batu Belat, the westernmost extremity of Borneo, is a prominent point which can be identified by five peaks close together, of which the highest, Batu Belat (*Lat. 0° 49′ N., Long. 108° 52′ E.*), about three-quarters of a mile eastward of the point, rises to an elevation of 686 feet (209m1).

Batu Pajung (Payung), above water, lies about a quarter of a mile offshore, and three-quarters of a mile southward of the extremity of Tanjong Batu Belat.

Burung eilanden.—Dangers.—Burung eilanden are a group of steep-to, densely wooded islands, lying within about 10 miles of the west coast of Borneo, between Tanjong Bangkai and Tanjong Batu Belat.

Sitindjan (Sitinjan), 151 feet (46m0) high, the southernmost island of the group, lies about 10½ miles westward of Tanjong Bangkai. A bank, with depths less than 10 fathoms (18m3) over it, extends about one mile southward and half a mile northward from the island. During northerly winds, or at the change of the monsoons, vessels can anchor on the southern part of this bank, in depths of from 7 to 9 fathoms (12m8 to 16m5).

Damar, about 3 miles north-eastward of Sitindjan, is a small steep-to islet, 76 feet (23m2) high, on which there are a few trees.

Temadju (Temaju), 781 feet (238m0) high, lies about 2¾ miles westward of Tanjong Sanggau, from which it is separated by a channel about one mile wide, with a least depth of 5½ fathoms (10m1) in the fairway. The island is steep-to except on the northern part of the eastern side where a reef extends about 2 cables offshore.

There is good anchorage for small vessels with local knowledge during the South-west monsoon, in a depth of 5 fathoms (9m1), in Djaksa baai, the westernmost of the two bays which form the northern coast of the island; vessels can also anchor, in depths of from 6 to 7 fathoms (11m0 to 12m8), anywhere off the island.

Baru, 224 feet (68m3) high, lies about 7¾ miles north-westward of Temadju; a reef fringes the island and extends about a quarter of a mile southward and north-westward from it. A small steep-to shoal, with a least depth of 4 fathoms (7m3) over it, which never shows, lies about half a mile north-westward of Baru.

Randajan, an island, 69 feet (21m0) high, lies on a bank, with depths of from 6 to 8 fathoms (11m0 to 14m6) over it, about 6½ miles north-north-westward of Baru. A shoal, with a least depth of 4¼ fathoms (7m8) over it, which is not marked by discoloration, lies about 4¾ miles eastward of Randajan. Seluas (page 79) in line with the north-eastern extremity of Kabung (page 79), bearing about 356°, leads

Charts 941a, 2660a, 1263.

Digitized by Google

Chart 3720.

close westward, and Seluas in line with the south-western extremity of Kabung, bearing about 341°, leads eastward of this shoal.

Lemukutan, the largest and westernmost island of the group, lies about one mile northward of Randajan, from which it is separated by a channel with a least depth of 8 fathoms (14m6). It consists of a ridge of hills, the highest of which, situated near its southern end, attains an elevation of 1,198 feet (365m1). The coast, except near the middle of the eastern side, is cliffy. Two rocks, with depths of less than 6 feet (1m8) over them, lie, respectively, about 3½ cables westward and about 2½ cables east-north-eastward of the northern extremity of the island.

Penata besar, 338 feet (103m0) high near its northern end, lies about 2 miles eastward of the southern part of Lemukutan; the channel between these islands is deep and clear of dangers. A bank, with a depth of 1½ fathoms (2m7) over it, and steep-to, extends about 2½ cables from the western side of Penata besar. Batu Rakit are some rocks above water lying about 2 cables northward of Penata besar.

Penata kechil (*Lat. 0° 45′ N., Long. 108° 48′ E.*) is a small island, 344 feet (104m8) high, lying on a ridge of the coastal bank, about one mile eastward of Penata besar, from which it is separated by a clear channel; Seluas, an islet, 79 feet (24m1) high, lies about 4 cables north-eastward of Penata kechil; the channel between them is foul. Detached shoals with depths of from 3½ to 4½ fathoms (6m4 to 8m2) over them, lie within about 1¾ miles north-north-westward of these islands.

Kabung, 968 feet (295m0) high, the northernmost island of the group, lies about 4 feet northward of Seluas; a spit, with a least depth of 3½ fathoms (6m4) over it, extends about one mile southward from this island, and a shoal, with a least depth of 3¾ fathoms (6m9) over it, lies about a quarter of a mile northward of its north-western extremity.

Two shoals lie in the fairway between Kabung and Tanjong Batu Belat (page 78); one, with a least depth of 4½ fathoms (8m2) over it, lies about 1½ miles south-eastward of the southern end of the island; the other, with a least depth of 2¼ fathoms (4m1) over it, lies about the same distance eastward of its north-eastern end.

Tidal streams.—The tidal streams round Burung eilanden set north-eastward and south-westward, at a maximum rate of about 2 knots.

Charts 3721, 3720.

Directions.—A vessel proceeding against the monsoon on the west coast of Borneo will avoid the monsoon drift, and often experience a favourable tidal stream and calm water, by keeping reasonably close inshore. A vessel approaching from southward may keep relatively close to the coast from abreast Tanjong Burung until past Tanjong, Bangkai, carrying a depth of about 6 fathoms (11m0).

Chart 3720.

A vessel proceeding northward from the vicinity of Tanjong Bangkai should steer to pass about 5 cables eastward or westward of Temadju; thence she should steer to pass between Baru and the coast, and through one of the channels separating Burung eilanden, or between those islands and the mainland, taking care to avoid the dangers described above.

Coast.—Lights.—Tanjong Badjau (Bajau), about 5 miles north-

Digitized by Google

Chart 3720.

eastward of Tanjong Batu Belat, is a high precipitous point, rising at about 1½ miles inland to Besar, 1,001 feet (305m1) high. Batu Bendang lies about 3 cables north-north-westward of Tanjong Merah, situated about midway between the two points. Between Tanjong Badjau and Tanjong Bila, about 18 miles northward, the coast forms Baai van Singkawang, into the southern part of which Sungei Singkawang discharges. With the exception of Tanjong Gunung (Gunong), 506 feet (154m2) high, situated about 4½ miles southward of Tanjong Bila, the whole of this stretch of coast is low and flat. Sjakok (Siakok), 994 feet (303m0) high, situated about 4½ miles eastward of Tanjong Badjau, and Sekunang, 325 feet (99m1) high, about 9 miles northward of Sjakok, are prominent.

Sungei Singkawang discharges about 5 miles north-eastward of Tanjong Badjau; the entrance to this river, which almost dries, can be identified by a flagstaff, from which a cylinder, painted in black and white bands, is displayed.

A light (*Lat. 0° 55′ N., Long. 108° 58′ E.*) is exhibited, at an elevation of 36 feet (11m0), from a post on the southern side of the entrance to Sungei Singkawang.

A light is exhibited, at an elevation of 16 feet (4m9), from a wreck at the entrance to the river.

Singkawang, a town of some importance, is situated about 2 miles above the mouth of the river; it is the residence of an Administrative Officer. There is regular steamer communication with Singapore, and telephonic communication with Pontianak and Sambas. A Port Medical Officer is stationed at Singkawang.

Sungei Selakau and Sungei Sebangkau discharge about 6½ and 3 miles, respectively, southward of Tanjong Bila; neither of these rivers is of importance to shipping.

Tanjong Bila is flat and is difficult to identify; from the offing, the western edge of Pemangkat, 1,112 feet (339m0) high, situated about 3½ miles eastward, is commonly mistaken for this point.

Anchorage.—There is good anchorage off the mouths of Sungei Singkawang and Sungei Selakau; there is also good holding ground, in stiff mud, anywhere in Baai van Singkawang.

The limits of Reede Selakau are a line drawn in a 202½° direction through Tanjong Gunung and the parallel through Sekunang heuvel.

The limits of Reede Singkawang are a line drawn in a 270° direction from Tanjong Badjau, the meridian through Tanjong Merah and the parallel through a position 2 miles northward of the mouth of Sungei Singkawang.

Groote Sambas rivier.—Light.—Beacon.—Buoy.—Obstruction.—Groote Sambas rivier is entered between Tanjong Bila and

Groote Sambas rivier entrance, bearing 040°, distant about 20 miles.
(*Original dated* 1929.)

Tanjong Kalang Bau, about 3 miles north-eastward. The mouth of this river is easily identified by Penibungan heuvel, 214 feet (65m2)

Charts 941a, 2660a, 1263.

Digitized by Google

Chart 3720.

high, a spur of Pemangkat berg, which forms its southern inner entrance point, and the two hills, 233 feet and 253 feet (71m0 and 77m1) high, respectively, on Tanjong Kalang Bau. Raja (Raya), an isolated hill, rising over a point to an elevation of 391 feet (119m2), situated about 5 miles north-north-eastward of Tanjong Kalang Bau, is also prominent.

A light is occasionally exhibited, at an elevation of 36 feet (11m0), from a mast, on Tanjong Kalang Bau.

Flats, with depths of less than one fathom (1m8) over them, extend about three-quarters of a mile north-westward from Tanjong Bila and as much as 3¼ miles westward and 3½ miles north-westward from Tanjong Kalang Bau; Pekak, a prominent rocky islet, 97 feet (29m6) high, lies on the northern flat about one cable north-westward of Tanjong Kalang Bau.

The mouth of the river is fronted by a bar, the steep-to outer edge of which lies about 2 miles seaward of Tanjong Bila (*Lat. 1° 10′ N., Long. 108° 55′ E.*); on the bar the least depth in the fairway, in 1950, was 8 feet (2m4). The river entrance is generally obstructed by fishing stakes and net floats.

A beacon stands about 1¼ miles south-westward of Tanjong Kalang Bau.

An obstruction, marked by a red spherical buoy, surmounted by a truncated cone, lies about 1¼ miles westward of Tanjong Kalang Bau.

A tide-gauge is situated on the northern side of the entrance to the river, about 2¾ miles westward of Tanjong Bau. It cannot be read by passing vessels. There are two fish traps, one southward and one south-eastward of the tide-gauge.

Belatjan islet, 47 feet (14m3) high, lies on the northern side of the entrance, close south-eastward of Tanjong Kalang Bau; some rocks, awash, are situated close south-westward of this islet.

Pemangkat village is situated on the southern side of the river close to Penibungan heuvel. There is regular steamer communication with Sambas and other coastal ports in the Nederlandsch Oost-Indië.

There is anchorage in Reede Pemangkat abreast the village; vessels anchoring here must bear in mind that the mud bank fringing the southern bank of the river between Penibungan heuvel and Tanjong Parakan, about 1¼ miles north-eastward, is steep-to.

The limits of Reede Pemangkat are, on the west, a line joining Tanjong Kalang Bau and Tanjong Bila and, on the east, a line drawn in a 146° direction from Raja heuvel.

From inside the bar to its confluence with Kleine Sambas, about 15 miles higher up, the depths in the fairway of Groote Sambas rivier are not less than 10 feet (3m0); thence to Kartijasa (Kartiyasa) village, about 10 miles farther, the least depth in the fairway is 3¼ fathoms (5m9). Kartijasa village is connected to Sambas by a small canal which is navigable by native craft.

Bungin, an islet, lies on the southern side of the river about 7 miles above the mouth of Kleine Sambas rivier. Sungei Bantanan joins Groote Sambas rivier close northward of this island; owing to the strong current in this vicinity the banks off the entrance to the former river are of a shifting nature.

Directions.—From a position about 5 miles westward of Tanjong Kalang Bau a vessel should steer to pass about 275 yards (251m5) south-

Digitized by Google

Chart 3720.

ward of the tide-gauge, thence steer 090° towards the red spherical buoy, passing about half a cable northward of it ; when it is abeam she should steer 094° for the anchorage, which leads about one cable southward of the obstruction mentioned above.

Prohibited anchorage.—Telegraph beacons, which mark a submarine cable, stand on each bank of Groote Sambas rivier, near the western extremity of Bungin.

Anchoring is prohibited within a distance of about a quarter of a cable north-eastward and south-westward of a line joining the telegraph beacons. The limits of this prohibited area are marked by red triangular boards, situated on each bank of the river.

Kleine Sambas rivier. — Beacons. — Tide gauges. — Kleine Sambas rivier from its mouth to the village of Sambas, about 11 miles above, is narrow and winding ; except on the inner bar, it has depths, in the fairway, of not less than 20 feet (6^{m}1).

The inner bar, situated off the mouth of Sungei Se Batu, about 7 miles below Sambas village, consists of rocks through which there is a channel 82 feet (25^{m}0) wide, with a least depth, in 1946, of 9½ feet (2^{m}9). The wreck of the *Borneo* lies on the rocks on the western side of this channel. A stony patch, with a least depth of 9 feet (2^{m}7), lies about one cable south-westward of the wreck of the *Borneo* (*Lat. 1° 18′ N., Long. 109° 14′ E.*).

Two leading beacons, surmounted by white triangles, points up, are situated on the western side of the river northward of the wreck of the *Borneo* ; these beacons in line, bearing 015°, lead through the narrow channel.

The tidal stream towards the time of low water near the wreck of the *Borneo* is very strong.

There are two tide gauges in the vicinity of the wreck of the *Borneo* ; they are marked in feet, and in decimetres.

Two beacons are situated, one on either bank at Sambas village, to mark the telegraph cable crossing the river.

Sambas.—Sambas is a village in which is the residence of a European Administrative Officer ; it is chiefly inhabited by Malays, Chinese and Buginese.

There is a quay, 215 feet (65^{m}5) long, alongside which vessels drawing 13 feet (4^{m}0) can berth at any state of the tide. Abreast the quay the river is about 262 feet (79^{m}9) wide, and vessels up to 200 feet (61^{m}0) long can be turned.

There is regular steamer communication with Singapore.

A Port Medical Officer is stationed at Sambas.

A concrete bridge spans the river about 6¾ cables eastward of the flagstaff at Sambas.

Directions.—A vessel with local knowledge proceeding to Sambas should endeavour to reach the inner bar at slack water near high tide, bearing in mind that the in-going stream sets strongly into the mouth of Sungei Se Batu. A vessel arriving on the in-going stream, and intending to secure alongside the quay, should first swing on her anchor.

Reede Sambas, in Kleine Sambas rivier, lies between the mouth of Sempang Asam and a position about 7 cables below the Government flagstaff at Sambas.

Coast.—The coast between Tanjong Kalang Bau and Tanjong

Digitized by Google

Chart 3720.

Bajung (Bayung), 19 miles north-north-eastward, is low, flat, and free from off-lying dangers.

Pontianak, about half a mile south-westward of Raja heuvel, is a prominent islet, 113 feet (34m4) high.

Between Pontianak and Tanjong Bajung the coast is fringed by a gradually shelving bank of mud, with depths of less than 10 fathoms (18m3), which extends as much as 5½ miles offshore.

Chart 2104.

Between Tanjong Bajung and Tanjong Blimbing, about 20 miles north-eastward, and thence to Tanjong Munggu Resak, about 11 miles north-north-eastward, the coast is low and flat, until close southward of Sungei Paloh, which discharges eastward of Tanjong Blimbing, where there is a range of hills. Melintang heuvel, 1,129 feet (344m1) high, about 8 miles eastward of Tanjong Blimbing, is the most prominent of these hills.

The coastal bank, with very irregular depths of less than 10 fathoms (18m3) over it, extends as much as 8 miles from this part of the coast. A spit, with depths of from one to 3 fathoms (1m8 to 5m5) over it, extends about 14 miles north-north-eastward from Tanjong Bajung.

Approaches to Sungei Paloh. — Dangers. — Beacons. — A bank, with depths of from about 4 feet (1m2) to 3 fathoms (5m5) over it, lies close inside the edge of the coastal bank westward of the mouth of Sungei Paloh. It is marked near the southern end of its shoalest part by a black iron beacon, surmounted by a cone, situated about 5¼ miles westward of Tanjong Blimbing; a 1½-fathom (2m7) patch lies about 4 cables south-eastward of the beacon, and a shoal, with a least depth of 2¾ fathoms (5m0) over it, lies about 8 cables south-south-eastward of the beacon; a hard sand spit, with depths of less than 5 fathoms (9m1) over it, extends about 4 miles north-north-eastward from the northern end of the bank.

A spit, nearly awash in places, extends about 2¼ miles north-north-westward from Tanjong Blimbing. A white beacon, surmounted by a ball, stands about 2 cables northward of the northern extremity of the spit. The channel from northward lies eastward of this beacon and is marked by a similar beacon and a beacon surmounted by a red cylinder, situated about 1¼ miles and one mile, respectively, north-westward of Tanjong Blimbing.

Reede Paloh.—The limits of Reede Paloh are a line drawn in a 270° direction for about 8¼ cables from Tanjong Blimbing, thence 180° for about 3¾ cables, thence 090° to a position about 3¾ cables 180° from Tanjong Blimbing; the northern limit in Sungei Paloh is the parallel of 1° 47′ N.

Tanjong Blimbing (*Lat. 1° 45′ N., Long. 109° 16′ E.*), which, in 1949, was reported to have extended about 8 cables south-south-westward, is low. Tua, a low island with very tall trees on it, lies in the entrance to Sungei Paloh eastward of Tanjong Blimbing. Close westward of the southern end of Tua is an islet with some high casuarina trees on it; this islet and Tanjong Blimbing both have yellow beaches, and until the vessel is westward of the entrance are difficult to distinguish from one another.

Sungei Paloh.—Sungei Paloh is of little importance to shipping; its entrance between Tanjong Blimbing and Tua had, in 1949, a depth of 2 feet (0m6). Bakau is an islet on the eastern side of the

Digitized by Google

Chart 2104.

river about three-quarters of a mile north-eastward of the northern extremity of Tua. North-westward of Bakau there is an inner bar with a least depth of 10 feet (3m0). Above this bar the depths in the fairway are not less than 20 feet (6m1) as far as the confluence of Sungei Paloh with Sungei Sekuju (Sekuyu) and Sungei Bemban, about 9 miles higher up. Each of these rivers, and also Sungei Tjermai (Chermai), which enters Sungei Paloh about 2 miles below them, is navigable by vessels drawing 12 feet (3m7) for about 5 miles above its entrance.

There is a small pier at the Custom house on the eastern side of Tanjong Blimbing, about one mile from its extremity.

The neighbourhood of Sungei Paloh is thinly populated.

Directions.—Without local knowledge about possible changes in the depths off the southern and eastern sides of the outer bank, vessels should not attempt to pass southward of it.

Vessels with local knowledge intending to enter Sungei Paloh should approach with the summit of Asu Ansang, 1,966 feet (599m2) high, about 13½ miles north-eastward of Tanjong Blimbing, bearing 090°, until eastward of the hard sand spit which extends north-north-eastward from the outer bank; thence local knowledge is necessary.

Tidal streams.—During the in-going stream and also at high water, the tidal stream sets strongly south-south-westward over the bar.

Charts 2104, 1746.

Coast.—Tanjong Munggu Resak, locally known as Kamuning, is low and sandy. There is good landing, during the North-east monsoon, on a firm sandy beach free from rocks and sheltered from the surf, about half a mile southward of this point.

Tanjong Api, about 1½ miles north-eastward of Tanjong Munggu Resak (*Lat. 1° 56′ N., Long. 109° 20′ E.*), is a low sandy point covered with virgin forest; Munggu Resak, a prominent wooded hill, 231 feet (70m4) high, with sloping sides, lies about half a mile within the point.

Between Tanjong Munggu Resak and Tanjong Api, foul ground, with rocks which dry, extends about three-quarters of a mile offshore; a shoal ridge, with depths of less than 6 feet (1m8) over it, and steep-to on its outer side, lies about one mile west-north-westward of Tanjong Api.

Anchorage.—H.M.S. *Falmouth*, in 1933, anchored in a depth of 3½ fathoms (6m4), soft mud, about 2¼ miles 234° from Munggu Resak heuvel; the holding ground in this position is good.

Coast.—Dangers.—Light.—The coast between Tanjong Api and Tanjong Datu, about 20 miles east-north-eastward, is low and sandy, with occasional rocks. From a position about 6½ miles south-south-westward of Tanjong Datu the coast gradually rises and becomes rugged and precipitous as it approaches that point.

Two shoals, with a depth of 3 fathoms (5m5) over them, lie, respectively, about 2 miles north-eastward and 3 miles east-north-eastward of Tanjong Api.

A bank, with depths of less than 5 fathoms (9m1) over it, extends as much as 2¾ miles offshore about 6 miles eastward of Tanjong Api.

Tanjong Datu is the rugged and precipitous termination of a mountainous peninsula which rises to two prominent summits; Datu, 1,761 feet (536m7) high, situated about 2½ miles southward of the extremity of the point, and Malaka, 1,929 feet (588m0) high, about one mile farther southward.

Charts 2660a, 1263.

Digitized by Google

Charts 2104, 1746.

A light is exhibited, at an elevation of 527 feet (160m6), on Tanjong Datu. In 1946, the light was extinguished.

Pangi, 1,150 feet (350m5) high, is an isolated peak rising from the low ground about 2½ miles southward of Malaka; the mountainous country of the interior commences about 11 miles southward of Pangi. *See* views on chart 1746.

The western side of Tanjong Datu (*Lat. 2° 05′ N., Long. 109° 39′ E.*) is fringed by a narrow bank, on which there are some drying rocks. Four rocks, which dry, lie about half a mile northward of the extremity of the point.

There is an anchorage, in depths of from 6 to 8 fathoms (11m0 to 14m6), about one mile offshore on the western side of Datu peninsula.

Off-lying dangers.—Two shoals, with depths of 5 fathoms (9m1) over them, lie, respectively, about 7¾ miles and 9¼ miles north-eastward of Tanjong Api.

Niger bank, with a least depth of 4¼ fathoms (7m8) over it, lies about 4½ miles northward of Tanjong Datu, from which it is separated by a clear channel. With fresh northerly winds and a north-going stream there are tide-rips on this bank, which, from a distance, resemble breakers. There are strong eddies off Tanjong Datu.

Chart 2104.

Api passage.—Api passage, the channel separating Zuid Natuna eilanden from the north-west coast of Borneo, is deep and clear of dangers in the fairway, except for the 5-fathom (9m1) patches north-eastward of Tanjong Api, mentioned above, and Niger bank. Vessels using this passage by day can safely pass close southward of Merundung (page 50), the southernmost island of the Zuid Natuna group.

Tidal streams.—About 2 miles north-westward of Tanjong Api the streams set east-north-eastward and south-south-westward, at a rate of from 2 to 2½ knots; farther seaward between Tanjong Api and St. Petrus (page 50) they set southward and north-eastward. Off Tanjong Datu, during June, the stream was observed to set south-south-westward for 15 hours consecutively, at an average rate of 1½ knots. In Api passage the stream sets south-westward for from 16 to 19 hours each day.

Charts 2660a, 1263.

Digitized by Google

CHAPTER IV

NORTH-WEST COAST OF BORNEO—TANJONG DATU TO TANJONG BARAM, INCLUDING DANGERS NEAR THE MAIN TRACK TO PALAWAN PASSAGE

Charts 2660a, 2660b.

COAST.—Aspect.—Much of the country bordering this coast is low, but about 25 miles inland a mountain range stretches in a north-easterly direction through the island, terminating in Mount Kina Balu, 13,450 feet (4,099^{m}6) high, which lies about 60 miles from its northern end. There is also a coastal range running parallel with this range.

Climate and weather.—*See* page 22.

Chart 1746.

Coast.—Dangers.—Between Tanjong Datu and Tanjong Sipang (*Lat. 2° 05′ N., Long. 109° 38′ E.*), 45 miles east-south-eastward, the coast of Saráwak forms a bay, near the head of which Sungei Lundu and several rivulets discharge. Santubong entrance of Sungei Saráwak lies 5½ miles southward of Tanjong Sipang.

The coast between Tanjong Datu and Tanjong Serabang, about 6 miles southward, is fringed by a bank, on which there are several rocks, which dry from one to 8 feet (0^{m}3 to 2^{m}4), lying as much as half a mile offshore. A rock, which dries one foot (0^{m}3), situated about 1¾ miles south-south-eastward of Tanjong Datu, lies at the outer end of a foul spit which extends south-south-westward nearly one mile to the coast.

For the dangers off Tanjong Datu, *see* page 87.

Two shoals, with depths of 23 and 21 feet (7^{m}0 and 6^{m}4) over them, lie, respectively, about three-quarters of a mile and 2 miles eastward of Tanjong Datu ; the latter shoal is near the northern end of the bank, with depths of less than 6 fathoms (11^{m}0) over it, which extends about 6 miles south-south-eastward and joins the coastal bank with similar depths which continues eastward at distances of from 4 to 7 miles offshore.

Telok Serabang, entered between Tanjong Serabang and Pulau Datu, 122 feet (37^{m}2) high, lying close offshore about 1½ miles south-south-westward, is shallow and encumbered with rocks. Pulau Kera, 51 feet (15^{m}5) high, lies off the entrance, about 8 cables south-south-eastward of Tanjong Serabang.

Between Pulau Datu and Tanjong Blinsah, 5¼ miles south-south-eastward, the coastal bank, with depths of less than 3 fathoms (5^{m}5) over it, extends over 2 miles offshore in places ; the northern half of this bank is foul ; two detached shoals, with depths of 13 and 9 feet

Digitized by Google

Chart 1746.

(4m0 and 2m7) over them, lie about 2½ and 4¼ miles, respectively, south-south-eastward of Tanjong Serabang; a rocky patch, which dries 4 feet (1m2), lies about three-quarters of a mile east-north-eastward of Tanjong Blinsah.

Sungei Siru besar, which can only be entered by a boat in very fine weather, and Sungei Sematan discharge about 4 and 7 miles, respectively, south-eastward of Tanjong Blinsah. A Government station is situated near the north-western side of the entrance to Sungei Sematan.

A rock, which dries 7 feet (2m1), lies on the edge of the coastal bank, about half a mile northward of Tanjong Batu, situated about 11½ miles east-south-eastward of Tanjong Blinsah.

The entrance to Sungei Lundu, which is only available to boats with local knowledge, lies between Tanjong Bandang and Tanjong Sireh, situated, respectively, about 6½ miles south-eastward and 7½ miles east-south-eastward of Tanjong Batu; a sandbank, which dries, extends about 1½ miles seaward from its mouth, through which runs a shallow channel. Batu Lundu, a rock which dries 13 feet (4m0), lies about 1¾ miles north-north-westward of Tanjong Sireh. The town of Lundu stands on the left bank of the river about 12 miles from the entrance. Gunong Perigi, 2,984 feet (909m5) high, the highest of a group of summits, lies about 4¼ miles south-south-westward of Tanjong Batu.

Off-lying islands and dangers.—For Niger bank, northward of Tanjong Datu, *see* page 85.

Pulau Talang Talang (*Lat. 1° 55′ N., Long. 109° 46′ E.*), 371 feet (113m1) high, which has a sandy beach on its eastern side, and from which a bank extends a short distance southward, lies about 6 miles east-north-eastward of Tanjong Blinsah; the island is inhabited. Pulau Talang Talang kechil, 255 feet (77m7) high, lies about one mile south-south-westward of Pulau Talang Talang. Turtle rock, which dries 12 feet (3m7), lies about one mile south-south-westward of Pulau Talang Talang kechil.

Pulau Sampadi, 400 feet (121m9) high, lies about 1¾ miles offshore near the edge of the shore bank and about 8¼ miles east-north-eastward of Tanjong Sireh; rocks and foul ground extend about three-quarters of a mile from the western side of the island.

Chart 2660a.

Tidal streams.—Between Tanjong Api (page 84) and Tanjong Sirik (page 97) the tidal streams set north-eastward for about 4 hours, and south-westward for about 8 hours. Off Tanjong Datu, in June, the south-west-going stream has been known to run continuously for 15 hours, at an average rate of 1½ knots.

Charts 1822, 1746.

SUNGEI SARÁWAK AND APPROACHES. — Aspect. — Tanjong Sipang is the northern extremity of a mountainous peninsula which projects about 5 miles northward from the mainland; it may be identified from eastward or westward by two remarkable sugar-loaf peaks which are prominent from these directions. The southern peak of Gunong Santubong, 2,770 feet (844m3) high, is situated near the southern end of the peninsula about 4 miles southward of Tanjong Sipang.

Gunong Serapi, 2,988 feet (910m7) high and very sharp, situated about 12½ miles south-westward of Gunong Santubong, is prominent;

Chart 1263.

Digitized by Google

Charts 1822, 1746.

close westward of it, and at a slightly lesser elevation, is a lump resembling a castle which is not visible eastward of Gunong Santubong. *See* view facing page 73.

Sungei Saráwak has two navigable entrances; the Santubong, which is entered close westward of Tanjong Sipang, and the Muara Tebas which has its entrance close eastward of Tanjong Po, about 12½ miles east-south-eastward. The town of Kuching, the capital of the state of Saráwak, is situated on both banks of this river about 20 miles above the entrance to either branch. Vessels of about 240 feet (73m1) in length, and 16 feet (4m9) draught, can ascend the river as far as Kuching.

Muara Tebas entrance, which has a depth of 16 feet (4m9), is the one generally used; the depth in Santubong entrance is only 7 feet (2m1), and this entrance should not be attempted without local knowledge. During the North-east monsoon Santubong entrance is not practicable owing to the heavy swell on the bar.

Chart 1746.

Off-lying islands and dangers.—Pulau Satang besar (*Lat. 1° 47′ N., Long. 110° 10′ E.*), 678 feet (206m6) high, and heavily wooded, except on its south-eastern side, where there is a small plantation, is situated on the western side of the approach to Santubong entrance, about 5 miles north-eastward of Pulau Sampadi; it is steep-to, and free from dangers, except on the southern side, where a coral reef extends about one cable offshore.

Pulau Satang kechil, densely wooded, lies about one mile southward of Pulau Satang besar; the island is fringed by a reef, which extends about half a mile from its southern side.

Pulau Tukong Ara and Pulau Tukong Banun are two small islets, 47 and 55 feet (14m3 and 16m8) high, which lie, respectively, about 1½ miles eastward, and 2 miles south-eastward of Pulau Satang kechil.

The above islands lie on the outer part of a bank, with depths of less than 3 fathoms (5m5) over it, which extends about 3½ miles northward from the low sandy coast.

Cruizer rock, awash, and steep-to, lies about 3½ miles northward of Tanjong Sipang; in bad weather, or with a heavy swell, the sea breaks on this rock, but in fine weather it is difficult to distinguish, and it should then be given a wide berth. Tanjong Buloh and Tanjong Embang, on the eastern side of the peninsula of which Tanjong Sipang is the northern extremity, in line, bearing 171°, leads westward, and the western side of Tanjong Sipang in line with Gunong Serapi (page 87), bearing about 212°, leads south-eastward of Cruizer rock; Tanjong Po light (page 90) is obscured over the rock.

Pulau Lakei lies about 1½ cables offshore, and about 10 miles east-south-eastward of Tanjong Sipang; between them the coast forms a bay, the inner half of which dries.

A rock, 8 feet (2m4) high, lies close southward of Pulau Lakei, and a rock, 2 feet (0m6) high, lies about one cable south-eastward of the eastern extremity of the island. An islet lies about half a cable south-eastward of the latter rock.

Chart 1746, with plan of Santubong entrance.

Santubong entrance. — Dangers. — Buoy. — The approach to Santubong entrance lies between a bank, with depths of less than 6 feet (1m8) over it, extending 3½ miles northward from Tanjong

Digitized by Google

Chart 1746, with plan of Santubong entrance.

Sedungus, situated 6½ miles south-south-westward of Tanjong Sipang, and a bank, with depths of 6 feet (1m8) over it, extending about 1½ miles west-north-westward from the head of Telok Penyok, situated about 3 miles south-south-westward of Tanjong Sipang. There are two detached one-fathom (1m8) patches about 5½ and 12 cables farther west-north-westward; these detached patches lie on either side of the fairway across the bar.

Between Tanjong Tambak, about 4½ miles south-south-westward of Tanjong Sipang, and Cross point, about 1½ miles south-south-eastward of Tanjong Tambak, there is a bay, which dries out for about three-quarters of a mile from its head. Nap rocks, which dry about 10 feet (3m0), lie near the edge of the drying bank, 4½ cables southward of Tanjong Tambak.

Pulau Kra lies on the southern side of the entrance channel, 9 cables south-south-westward of Cross point; it is connected to the coast south-eastward by a bank, which dries, and a reef extends about 1½ cables northward from it. This islet is difficult to distinguish from seaward.

Rainbow reef, with a depth of less than 6 feet (1m8) over it, extends about 2 cables north-north-westward from the reef northward of Pulau Kra.

Royalist rock, awash, is situated about 4 cables northward of Pulau Kra; a red conical buoy is moored about one cable north-westward of the rock.

The bar has a least depth of about 7 feet (2m1) over it; its outer 3-fathom (5m5) edge lies about 6 miles seaward of Pulau Kra (*Lat. 1° 42′ N., Long. 110° 18′ E.*). On account of its sandy nature, and owing to freshets the bar is possibly subject to change.

Above the bar the river has depths of from 1¾ to 6 fathoms (3m2 to 11m0); a one-fathom (1m8) patch lies about one cable from the eastern bank of the river, about 1¼ miles northward of its junction with Sungei Siol, situated about 8 miles above the entrance. There are several dangers between this point and the junction with the main river at North junction point; the positions of these can be seen on chart 1822.

Directions.—A vessel approaching Santubong entrance from westward should steer for the 2,670-foot (813m8) peak of Gunong Santubong, bearing 131°, until Tanjong Sipang bears 065°, when she should steer for Bukit Siol, 345 feet (105m2) high, situated 8 miles southward of Cross point, bearing 164°, which leads over the bar in a least depth of 7 feet (2m1); when Cross point bears about 103° she should alter course gradually eastward and steer to pass between the point and the buoy marking Royalist rock; if entering with the in-going stream, care should be taken to make the turn in good time, to avoid being set on to this rock and the rocks south-westward of it. As local knowledge is essential for proceeding above Cross point, no further directions will be given.

Tidal streams.—The in-going stream sets eastward across the bar and the out-going stream westward; in the entrance the in-going stream sets towards Royalist rock. Both streams increase in strength directly the river is entered.

Chart 1822.

Muara Tebas entrance. — Lights. — Dangers. — Beacon. —

Charts 2106, 2660a, 1263.

Digitized by Google

Chart 1822.

Buoy.—Tanjong Po lies about 2 miles south-eastward of the point situated about 3½ cables eastward of Pulau Lakei. The coast between these points is mostly fringed by a bank, with depths of less than 3 fathoms (5m5) over it, extending from about 1½ to 3½ cables offshore. A rock, 4 feet (1m2) high, lies close outside this bank, half a mile northward of Tanjong Po. A 16-foot (4m9) patch lies about 3¼ cables north-north-eastward of Tanjong Po and there are several 3-fathom (5m5) patches between it and the point.

A light is exhibited, at an elevation of 490 feet (149m3), from a white pyramidal tower, 50 feet (15m2) in height, on Tanjong Po. Between Tanjong Po and Tanjong Selabat, about 3½ miles south-westward, there is a bay, from the head of which a sand and mud flat, which dries from one foot to 10 feet (0m3 to 3m0), extends about 1½ miles eastward. Between Tanjong Selabat and Tanjong Muara Tebas, nearly 1½ miles southward, is Telok Awar, which dries from 2 to 12 feet (0m6 to 3m7).

A pyramidal beacon (*Lat. 1° 39′ N., Long. 110° 29′ E.*), the upper part of which is white, stands on Gunong Ayer, 362 feet (110m3) high, the northern hill on Tanjong Muara Tebas.

An islet, 110 feet (33m5) high, lies close off Tanjong Selabat; two islets, 10 and 15 feet (3m0 and 4m6) high and about 50 feet (15m2) to the tops of the trees, lie about 2 cables south-south-westward of Tanjong Selabat; Rocky islet, 9 feet (2m7) high, lies about 5 cables southward of the same point. A rock, 5 feet (1m5) high, lies about 1¾ cables north-north-westward of Tanjong Muara Tebas.

Beting Matong, a sandy spit, with depths of from 10 to 18 feet (3m0 to 5m5) over it, lies in a north and south direction about 1½ miles eastward of Tanjong Po; its northern end lies nearly 2 miles north-eastward of the point.

The outer bar, situated about 2 miles south-eastward of Tanjong Po and composed of hard sand, lies between two banks, with depths over them of less than 3 fathoms (5m5), which extend north-eastward from either side of the entrance to the river, Beting Matong being the northern part of the eastern bank; there are depths of 11 feet (3m4) on the western bank near the western side of the outer bar, nearly 1¾ miles south-eastward of Tanjong Po. Several detached 3-fathom (5m5) patches lie in or near the fairway between positions about 1½ miles eastward and 2 miles south-eastward of the same point. In 1946, there was a least depth of 18 feet (5m5) on the outer bar.

Tanjong Embang comprises the coastal area on the southern side of the entrance point to the river between the points situated about 8 cables southward and 16 cables south-eastward of Tanjong Muara Tebas: a spit, which dries from 2 to 10 feet (0m6 to 3m0), extends about 9 cables north-eastward from the point.

North-easterly winds cause a considerable scend on the bar. In 1935, H.M.S. *Bridgewater*, drawing 12 feet (3m7), crossed the bar with a north-easterly wind 2½ hours before high water.

About one mile eastward of Tanjong Muara Tebas, the inner bar is formed, which, in 1946, had a least depth of 17 feet (5m2) on the leading line.

From the inner bar the river trends west-south-westward for about 3 miles to McDougall point, which lies on the southern bank, and thence follows a winding course for about 8½ miles to North Junction point where it joins the Santubong branch.

Charts 1746, 2106, 2660a, 1263.

Digitized by Google

Chart 1822.

A rock, with a depth of less than 6 feet (1m8) over it, lies about 1½ cables southward of Tanjong Muara Tebas, and there are several other patches, with depths of from 11 to 18 feet (3m4 to 5m5) over them, in that vicinity.

Otter rock, with a depth of 10 feet (3m0) over it, lies in mid-channel about 1½ miles west-south-westward of Tanjong Muara Tebas.

Tanjong Batu, where there is a pier and a mooring buoy, lies on the northern bank of the river about 2¼ miles west-south-westward of Tanjong Muara Tebas; a rock, which dries 3 feet (0m9), lies about half a cable westward of the pier.

Belcher rocks, with a depth of less than 6 feet (1m8) over them, lie about half a mile south-westward of Tanjong Batu, and about 1¾ cables off the northern bank of the river.

Between McDougall point and North Junction point (page 89) there are several shoals. About half a mile southward of McDougall point a bank, with depths of less than 3 fathoms (5m5) over it, extends about 2¼ cables from the eastern shore. Beting Tanju, a shoal, with a least depth of 2 fathoms (3m7) over it, lies in the middle of the river, about 2¼ miles above McDougall point (*Lat. 1° 37′ N., Long. 110° 27′ E.*). About one mile farther westward, between Tanjong Buaya and Tanjong Bakau, about one mile westward, a bank, with depths of less than 6 feet (1m8) over it, extends about 2 cables from the southern shore, and there are depths of less than 3 fathoms (5m5) about one cable farther offshore. About one mile south-westward of Tanjong Bakau, a bank, with depths of less than 3 fathoms (5m5) over it, extends about 1¾ cables from the north-western shore. A 17-foot (5m2) patch lies in the fairway off the north-eastern end of this bank.

About 1½ miles above Tanjong Bakau, Sungei Saráwak turns northward into Turnabout reach and narrows to about 1¼ cables and thence flows through Prima Donna, Horseshoe and Town reaches to Kuching, with a width of from one to 2 cables. At Pending, on the south-western side of the entrance to Turnabout reach, there is a pier. Sungei Kuap here joins the main river from southward.

Leading lights are shown from the coast south-eastward of Tanjong Embang. The front light is exhibited, at an elevation of 60 feet (18m3), from a white beacon surmounted by a diamond. The rear light is exhibited, at an elevation of 90 feet (27m4), from a black and white beacon surmounted by a diamond, about 4 cables south-south-westward of the front beacon. These lights were reported, in 1948, to be unreliable.

Leading lights are shown from the western bank of the river opposite McDougall point. The front light is exhibited, at an elevation of 60 feet (18m3), from a white beacon surmounted by a diamond. The rear light is exhibited, at an elevation of 90 feet (27m4), from a similar beacon, situated about 4 cables west-south-westward of the front beacon. These beacons in line, bearing 247°, lead up the river as far as McDougall point. These lights were reported, in 1948, to be unreliable.

Pilots.—A pilot can be obtained from Kuching; at least 24 hours' notice of the estimated time of arrival off Tanjong Po should be given.

Anchorages.—Directions.—A vessel waiting for the tide for entering the river may obtain anchorage about 1½ miles northward of Tanjong Po, in a depth of about 5 fathoms (9m1).

To reach Kuching on one flood tide it is necessary to leave this

Digitized by Google

Chart 1822.

anchorage at least 3 hours before high water. It is advisable to arrive at Kuching one hour before high water if proceeding alongside the wharves, as the turn can only be done on the in-going stream. The vessel should lie alongside with her starboard side to the wharf with no overlap at the southern end. She should leave about one hour before high water, at which time the stream tends to set her off the wharf.

No vessel should attempt to enter the river without local knowledge.

Charts 1822, 1746.

A vessel approaching from westward may pass on either side of Cruizer rock and after rounding Pulau Lakei should steer to pass about one mile eastward of Tanjong Po lighthouse, and thence between the 3-fathom (5^m5) lines northward of the outer bar. When the lighthouse bears 304°, distant about 2 miles, she should keep the outer pair of leading light beacons in line, bearing 209°, until the inner pair of leading light beacons are in line, bearing 247°, when she should keep on this alignment, which leads over the inner bar, in a depth of 17 feet (5^m2). As local knowledge is essential for proceeding above McDougall point, no further directions will be given.

Chart 1822.

The usual anchorage is off Pending, near the entrance to Sungei Kuap, in a depth of about 28 feet (8^m5); between this position and the junction with the Santubong entrance, about $1\frac{3}{4}$ miles farther up the river, the holding ground is bad.

Vessels 240 feet (73^m1) long and drawing not more than 11 feet (3^m4) can moor off Kuching, about one cable southward of Henderson point (*Lat. 1° 34′ N., Long. 110° 20′ E.*), or in mid-stream off the entrance to the dry dock; there is anchorage for small vessels between the sago factory on the southern side of the river near the eastern end of the town, and Samarang rocks, about 4 cables eastward. Vessels using the anchorages off the town must moor head and stern.

Prohibited anchorage.—Anchorage is prohibited in Turnabout reach and in the vicinity of the pipe line and electric cable which cross the river between Fort Margherita and the Borneo Company's offices at Kuching.

Tidal streams.—The ebb-stream sets out of Sungei Kuap with a rate of from $2\frac{1}{2}$ to 4 knots, and the flood-stream sets in with a rate of from $1\frac{1}{2}$ to 2 knots. Off Kuching the flood stream is weak; the ebb-stream is stated to run from 4 to 5 knots at spring tides, and from one to 3 knots at neap tides. In the entrances these rates are about halved. The tidal streams meet and separate near North Junction point, about $1\frac{3}{4}$ miles above Pending. There appears to be no period of slack water in the river; for about 2 hours on a rising tide the ebb stream continues to run.

Signal stations.—There are signal stations at Pending and Lintang, the latter situated on the eastern bank of the river at its junction with Sungei Santubong. Signals are also displayed at the shipping office in Kuching.

The following signals are displayed:—

(*a*) A white ball indicates that a steam vessel, not exceeding 80 tons net register, is proceeding towards the station displaying the signal, and although the white ball may be hoisted, nevertheless vessels may proceed, provided a prolonged blast is given on the whistle or syren at each bend of the river.

Charts 1746, 2106, 2660b, 1263.

Digitized by Google

Chart 1822.

(*b*) A black ball indicates that a steam vessel exceeding 80 tons net register is proceeding towards the station displaying the signal, and no vessel exceeding 40 tons net register may proceed until this signal is hauled down.

Regulations.—The following are extracts from the shipping regulations :—No steam vessel exceeding 80 tons net register shall be under way in the Saráwak river above Pending between the hours of 1900 and 0500.

Steam vessels when approaching Prima Donna and Dido rocks, situated about 1¾ and 3½ miles, respectively, above North Junction point, and when approaching a bend, shall give one prolonged blast on the whistle or syren.

Steam vessels exceeding 80 tons net register may not overtake or pass another vessel in the Bintawak channel between Prima Donna rock and the channel mark on the true left-hand bank of the river, and no steam vessel exceeding 80 tons net register may overtake or pass another vessel above the channel mark "steer across the river" on the true right-hand bank of the river opposite Warren point, at the eastern end of Town reach.

No vessel may anchor in the channel between the channel mark opposite Warren point and Brooke dock, about 2 miles westward, except in an emergency when a report shall be immediately made to the Shipping Office. A vessel compelled to anchor between the points mentioned shall hoist, where it can best be seen, one black ball not less than 2 feet (0m6) in diameter.

Kuching.—The town of Kuching (*Lat. 1° 34′ N., Long. 110° 21′ E.*) stands on both sides of the river, but with the exception of the Astana, or house of the Rajah, and the Fort, all the main Government buildings are on the south side, where there is also a market.

The population, in 1949, was about 38,000.

Harbour facilities.—A small quantity of coal is maintained, and can be supplied at a rate of 10 tons an hour. Vessels can be coaled alongside the Government wharf and at the anchorage off Pending. Water is laid on to the principal wharves. Provisions are scarce. There is a modern hospital with a few beds for Europeans.

Small repairs can be effected at the Government workshops. There are two cranes, one of which has a lifting capacity of 10 tons.

There is a dry dock, *see* Appendix I.

There are six wharves, two of which are suitable for sea-going vessels, and have depths of from 8 to 14 feet (2m4 to 4m3) alongside; the remainder have depths of from 4 to 8 feet (1m2 to 2m4) alongside.

Communication.—There is regular steamer communication with Singapore, Labuan, and the ports of Saráwak and British North Borneo.

Radio station.—There is a radio station at Kuching. *See* page 21.

Trade.—The principal exports are timber, beeswax, pepper, canes, copra, fish, gold and benzine; agriculture is the principal industry. The chief imports are cloth, salt, tobacco, rice, provisions, wines, spirits, tea, ironware, cement and coffee.

Chart 2106.

COAST.—Dangers.—The coast between the eastern extremity of Tanjong Embang and the entrance to Batang Samarahan, about

Digitized by Google

Chart 2106.

3 miles south-south-eastward, and thence to the entrance to Batang Sadong, about 11 miles farther eastward, is fringed by a flat with depths of less than 4 fathoms (7m3) over it, extending from 7 to 10 miles offshore, and numerous fish stakes are found within 3 miles of the coast.

Batang Sadong.—This river has an extensive bar of soft mud, with a least depth of 5 feet (1m5) in the middle and decreasing in depth eastward towards the extensive drying mud flat off Tanjong Melaban. The best approach and crossing of the bar is from north-westward. After crossing the bar there are no dangers between the entrance and Simunjan, about 20 miles up river. Except for the straight reach below Simunjan, where there is one foot (0m3) less, the main channel of the river has a least depth of 8 feet (2m4). Greater depths occur on the outer sides of the bends where the tidal streams are strongest, and scouring takes place, whilst there is corresponding silting on the inner curves. The banks of the river are fringed with mangrove, jungle and occasional small clearings of cultivation.

Simunjan, a small town on the east bank of the river, was formerly an active port. Remains of a wharf are sometimes visible at low water. Small quantities of vegetables and fresh water may be obtained.

Tidal streams.—Bore.—The tidal streams in the river are strong, attaining a rate of about 3½ knots in the entrance and 5 knots off Simunjan at springs. A tidal bore, which develops near Tanjong Baluku, and reaches Gedong, about 25 miles above Simunjan, occurs at each spring tide. The approach of the bore is heard as a roaring sound, and at Simunjan it takes the form of a curling wave, from 3 to 5 feet (0m9 to 1m5) high, followed by broken water. With the passage of the bore the stream turns instantly from ebb to flood and the level of the water rises rapidly about 4 feet (1m2), and then continues to rise normally with the tide. The full force of the bore is felt at Simunjan, where small boats avoid the worst by sheltering on the opposite bank, just above Tanjong Tanglong.

Batang Lupar. — Islet and dangers. — Batang Lupar is entered between the mouth of Sungei Sebuyau, situated about 10 miles south-eastward of Tanjong Melaban, the eastern entrance point of Batang Sadong, and a point about 4½ miles north-eastward.

Bukit Silabu, 1,430 feet (435m9) high, and Gunong Bediri, 1,350 feet (411m5) high, situated about 5¾ and 8 miles south-south-eastward, respectively, of Tanjong Melaban, are useful marks.

Chart 1745, plan of Batang Lupar and entrance.

About one mile south-westward of Kampong Sebuyau, situated on the eastern side of the entrance to Sungei Sebuyau, is a hill, about 410 feet (125m0) high to the tops of the trees.

Pulau Burong (*Lat. 1° 38′ N., Long. 110° 48′ E.*), about 345 feet (105m2) high to the tops of the trees, lies about 3¼ miles north-north-eastward of Tanjong Melaban.

Triso Darat, a hill, 390 feet (118m9) high to the tops of the trees, lies about 2¾ miles southward of the eastern entrance point, and Pulau Triso, 303 feet (92m3) high to the tops of the trees, lies in the middle of the entrance, about 7 cables west-south-westward of Triso Darat.

The bar, which is of very soft mud, with a least depth of 7 feet (2m1), lies with its outer end about 15 miles seaward of Pulau Triso; the

Digitized by Google

Chart 1745, plan of Batang Lupar and entrance.

depths are reported to be slightly greater, and the bottom softer, on the south-western than on the north-eastern part of the bar.

Between Pulau Triso and Lingga, a village at the mouth of Sungei Lingga on the south bank of Batang Lupar, about 14 miles south-eastward, there are depths of from 11 to 28 feet (3m4 to 8m5) in the fairway, and for 17 miles from the entrance the river flows through dense jungle.

A bore occurs in this river, and a smaller bore in Sungei Lingga; the largest bores occur three days after new and full moon, those after the new moon being the greater. The large bores are usually first observed just below Pulau Seduku, about 25 miles above the entrance to the river, and travel about 40 miles farther up stream; in times of very low river they have reached Engkilili, about 65 miles above the entrance. In the large bores the advancing wave is said to attain a height of 6 feet (1m8) when about 3 miles above Pulau Seduku, and the speed of advance, which is dependent on the configuration of the river bed, is estimated to be about 10 knots at Simanggang, about 19 miles above that island.

Directions.—To enter the river a vessel with local knowledge should steer for Pulau Burong, bearing 160°, and pass a safe distance north-eastward of it, thence she should steer towards the south-western side of the entrance and pass south-westward of Pulau Triso; in the channel on the north-eastern side of the islet there are strong eddies.

Tidal streams.—Tidal influence is felt for some miles above Simanggang. At the entrance the in-going and out-going streams commence about 1¾ hours after low and high water at Pulau Satang (page 88), and have rates of about 2½ and 3½ knots, respectively. *Chart 2106.*

Coast. — Light. — Beacon. — Dangers. — Sungei Saribas, which has its entrance about 10 miles north-north-eastward of the mouth of Batang Lupar, has not been surveyed. In 1858, H.M.S. *Mohawk*, drawing 12½ feet (3m8), entered this river and proceeded for a distance of 40 miles above the mouth; her boats continued for another 30 miles, with deep water, but with a constantly narrowing channel. The tidal streams in this river are reported to be strong.

The river is over 100 miles long; vessels with a draught of 5 feet (1m5) can ascend to Betong, about 50 miles from the entrance; above Betong it is known as Batang Layar. Between Betong and a point some miles below Spaoh, situated about 6 miles below, the river is subject to a bore.

A bank, with depths of less than 5 fathoms (9m1) over it, extends about 15 miles north-westward from the entrance to Sungei Saribas, and there is a depth of about 2¼ fathoms (4m1) in the river entrance. The bank, with depths of 3 fathoms (5m5) or less over it, extends about 11 miles north-westward and northward from Tanjong Batang Marow, the northern entrance point of the river; on this bank are Pasir Dua Blas and Beting Maro, two sandbanks, with depths of 3 feet (0m9) over them, situated about 7 miles north-westward and 5 miles northward, respectively, of Tanjong Batang Marow. A bank, with a least depth of one foot (0m3) over it, extends about 6½ miles northward from a position about 2½ miles north-north-westward of Tanjong Batang Marow.

Tanjong Selalang (*Lat. 2° 06′ N., Long. 111° 12′ E.*) lies 21 miles

Digitized by Google

Chart 2106.

north-north-eastward of Tanjong Batang Marow; the land in its vicinity is low.

A light is exhibited, at an elevation of 70 feet (21m3), from a flagstaff on Tanjong Selalang, but it is not visible from seaward.

A white triangular beacon, 25 feet (7m6) in height, stands on the coast about 1¼ miles southward of Tanjong Selalang.

Charts 1948, 1945.

Batang Rajang. — Light. — Beacon. — Pilots. — Tanjong Jarijeh lies about 5 miles north-north-westward of Tanjong Selalang; Kuala Rajang, the mouth of Batang Rajang, is entered between these two points. The river is navigable by vessels, with local knowledge, drawing 12 feet (3m7) as far as Sibu, about 70 miles above its mouth; at high river vessels drawing 17 feet (5m2) and up to 300 feet (91m4) in length can reach Sibu. There are two difficult bends between Sarikei, about 27 miles from the entrance, and Sibu, one at the junction of Muara Payang and the other at the junction of Batang Leba-An, 5 and 15 miles, respectively, above Sarikei; the latter needs special care and should not be taken on the ebb tide. Light draught steamers can proceed to Kapit, about 90 miles above Sibu. A vessel 200 feet (61m0) in length and drawing 14 feet (4m3) has visited Kapit.

There is a wharf, consisting of two floating pontoons of a total length of about 150 feet (45m7), at Sarikei, with a depth of 28 feet (8m5) alongside; there is also a wharf at Binatang, about 12 miles above Sarikei, with a depth of 24 feet (7m3) alongside. Vessels can lie at these wharves in any weather.

Reliable Malay pilots are available at Kuching.

The entrance is obstructed by an extensive shoal, with a least depth of 16 feet (4m9) over it, lying with its outer edge 3¾ miles westward of Tanjong Jarijeh (*Lat. 2° 10′ N., Long. 111° 10′ E.*).

A light is exhibited, at an elevation of 90 feet (27m4), from a white steel framework structure, about 5½ cables south-south-eastward of Tanjong Jarijeh. The light-structure shows up well in the afternoon, but is difficult to identify with the sun in the east.

The approach to the entrance lies between the extensive shoal mentioned above and the bank extending from Tanjong Jarijeh, and, in 1947, had a least depth of 23 feet (7m0) on the leading line. Within the entrance there are depths of from 3 to 10 fathoms (5m5 to 18m3) as far as a bend in the river about 45 miles from its mouth where there is a depth of 9 feet (2m7).

The town of Rajang stands on the north bank about 4¼ miles from the entrance. The Court house in the town is a white building and is conspicuous; there is also a flagstaff and radio masts, which are now disused.

Anchorage.—Directions.—The best anchorage for small vessels is, in depths of from about 5 to 9 fathoms (9m1 to 16m5), stiff black mud, in mid-channel southward of Rajang. The holding ground is good, but the tidal streams are strong, and heavy squalls are frequent, for which reasons, vessels are recommended to veer plenty of cable.

A vessel should approach the entrance with the white beacon situated 1¼ miles southward of Tanjong Selalang, bearing 144°, which leads across the bar south-westward of Tanjong Jarijeh in the greatest depth. After rounding the northern entrance point she should keep about half a mile from the northern side of the river and anchor as

Charts 2660a, 2660b, 1263.

Digitized by Google

Charts 1948, 1945.

convenient off Rajang. As local knowledge is necessary above Rajang no further directions will be given.

Chart 2660b.

Sibu.—The town of Sibu had, in 1947, an estimated population of 7,000 ; it is one of the principal ports of Saráwak, and the headquarters of the Resident of the district.

There are three wharves, two with a depth of 14 feet (4m3), and one with a depth of 8 feet (2m4) alongside. There is a hospital, but it has no accommodation for Europeans.

There is communication by steamer with Singapore and Kuching.

The principal exports are jungle produce, rubber and pepper.

Charts 1948, 2106.

Coast.—Light.—The coast between Tanjong Jarijeh and Tanjong Sirik, about 38 miles north-north-eastward, presents no identifiable features from seaward, being uniformly low and covered with palms, mangroves and low jungle. Kampong Betanak is situated about 9 miles southward of Tanjong Sirik. A bank, with depths of less than 3 fathoms (5m5) over it, extends from 2¼ to 4 miles from the whole of this stretch of coast.

Kuala Belawai, which is only available for small vessels with local knowledge, is entered between Tanjong Jarijeh and Tanjong Manat, about 4½ miles north-north-eastward.

An extensive bank of sand, which dries in patches, extends about 4½ miles from the north-eastern side of Tanjong Jarijeh, and Manat spit, which dries from one to 4 feet (0m3 to 1m2), extends about 2½ miles westward from Tanjong Manat.

The bar, with a least depth of 11 feet (3m4), is situated about 4 miles westward of Tanjong Manat.

Chart 2106.

Kuala Paloh lies about half-way between Tanjong Jarijeh and Tanjong Sirik ; it is about 3 miles wide in the entrance and there are several sandy patches, which dry, in the approach. At low water, small craft with local knowledge, drawing about 12 feet (3m7), can enter the river which is navigable by small craft with local knowledge for 10 miles, its total length ; within the river entrance the depths increase.

Tanjong Sirik (*Lat. 2° 46′ N., Long. 111° 19′ E.*), the western entrance point of Kuala Bruit, is low and from it a bank, with depths of less than 3 fathoms (5m5) over it, extends about 5 miles westward and 6½ miles northward.

A light is exhibited, at an elevation of 60 feet (18m3), near the northern extremity of Tanjong Sirik ; the lighthouse is surrounded by trees and is almost invisible by day.

Tidal streams.—The tidal streams in the offing set north-eastward and south-westward, but inshore they follow more closely the trend of the coast. Westward of Tanjong Sirik the tidal streams set northward and southward at a rate of from 2 to 3 knots ; eastward of the cape the stream sets eastward and westward. There are tide-rips and overfalls near the shoals off Tanjong Sirik, especially with the north and east-going streams. There is considerable indraught with the north-east-going stream to the rivers between Sungei Saráwak and Tanjong Sirik.

Chart 2107.

Coast.—Dangers.—Lights.—Between Tanjong Sirik and the entrance to Batang Balingian, about 77 miles east-north-eastward, the

Digitized by Google

Chart 2107.

coast is low, partly cleared and partly wooded. The tops of the trees on the wooded parts may be visible from 12 to 15 miles offshore.

About 8 miles south-eastward of the mouth of Batang Balingian lies the northern extremity of a range of hills which trends south-eastward from this position; the most prominent peak of this range is named Table hill.

From the whole of this coast a mudbank, with depths of less than 3 fathoms (5^{m}5) over it, extends about 2½ miles seaward; this bank has not been closely examined.

Charts 2107, 2106.

Close eastward of Tanjong Sirik are Kuala Bruit and Kuala Matu, the two mouths of a large unsurveyed river which trends southward and joins Batang Paloh, about 10 miles from its entrance; the two mouths are separated by Pulau Patu. Bruit village stands on the western side of Kuala Bruit.

Chart 2107.

Batang Igan is entered about 20 miles east-north-eastward of Tanjong Sirik; the entrance is narrow and from it the coastal bank, with depths of less than 3 fathoms (5^{m}5) over it, extends about 2½ miles seaward. There is a depth of about 6 feet (1^{m}8) on the bar. From its entrance the river, with depths, in 1879, of from 2 to 12 fathoms (3^{m}7 to 21^{m}9), and about three-quarters of a mile wide, trends south-eastward and southward for about 50 miles to its junction with Sungei Rajang at Sibu.

The village of Igan stands on the eastern side of the river about 3 miles above its entrance.

Batang Oya is entered about 13 miles eastward of Batang Igan; the bar has a depth of 3½ feet (1^{m}1) over it. Above the bar the narrow and winding channel is marked, during the South-west monsoon, by stakes. There is a Government station at Oya, which stands on the eastern bank of the river.

Two lights, vertically disposed, are exhibited near the western side of the entrance to Batang Oya.

Pamuit river and Sungei Judan discharge about 4½ and 6½ miles, respectively, eastward of Batang Oya; neither has been examined, and they are only available to boats. Batang Mukah discharges about 10½ miles eastward of Batang Oya; the depth in its entrance is about 3 feet (0^{m}9). The town of Mukah, situated about 3 miles within the entrance of the river, had, in 1934, a population of 8,000.

A light (*Lat. 2° 54′ N., Long. 112° 05′ E.*) is exhibited at Mukah.

Between Batang Mukah and Tanjong Tatau, 49 miles eastward, the rivers Tembongan, Nipa, Tiding, Balingian and Tatau discharge, the positions of which may best be seen on the chart; none of them is of any importance to shipping.

Chart 2108.

Coast.—Light.—Between Tanjong Tatau and Tanjong Kidurong, about 15 miles north-eastward, the coast gradually curves northward forming a bay, near the head of which lies Kuala Bintulu, the entrance to Batang Kemena, where the small town of Bintulu is situated. The whole of this coast is low and featureless, with the exception of Bukit Buan, a prominent mountain about 15 miles south-south-westward of Bintulu. Mud flats, which dry, extend about 3 cables offshore.

Chart 1748.

Bukit Nyabau, 720 feet (219^{m}5) high to the tops of the trees, about

Digitized by Google

Chart 1748.

3½ miles south-south-eastward of Tanjong Kidurong, is the highest and most prominent hill in the vicinity.

In rainy weather discoloured water from Batang Kemena extends several miles offshore; large tree trunks are carried down by the river, and may be a danger to navigation.

A light is exhibited, at an elevation of 77 feet (23m5), from an iron framework structure, on Tanjong Kidurong.

Current.—At a distance of about 10 miles offshore, during the South-west monsoon, the current sets north-eastward at a rate of about one knot.

Batang Kemena.—Lights.—There is a bar at the entrance to Batang Kemena, with a least depth of 4 feet (1m2); the channel is marked by two pairs of leading beacons, from which lights are occasionally exhibited. The outer and northern pair are in line bearing 132°, and the inner pair, 138°. The river is navigable by any vessel with local knowledge that can cross the bar for about 50 miles as far as the village of Tubau.

Bintulu.—The town of Bintulu is mainly situated on the north-eastern side of Kuala Bintulu, about half a mile up the river. There are two small piers at Bintulu (*Lat. 3° 10′ N., Long. 113° 03′ E.*).

Government pier, on the eastern side of the river, is only available for boats with a draught up to 3 feet (0m9). The Customs pier, also on the northern side, about 2 cables above the Government pier, has a depth of 8 feet (2m4) alongside, and can accommodate any vessel capable of crossing the bar.

The population of Bintulu, in 1948, was about 4,000.

Bukit Jepak, 260 feet (79m2) high to the tops of the trees, lies on the southern side of the river, about 1¾ miles from the entrance.

Anchorages.—Anchorage may be obtained outside the 3-fathom (5m5) line, with good holding ground, with the Government flagstaff at Bintulu, bearing 138°, distant 3 miles. Small vessels may obtain anchorage sheltered from the North-east monsoon in Telok Plan, close eastward of Tanjong Kidurong, with the light-structure on the point bearing 340°, distant 7 cables, in a depth of 2½ fathoms (4m6) mud.

Flow.—In the river, and in its entrance and immediate approaches the flow is mainly due to an out-going current in the surface layers. In the entrance the observed rate of the current was from one to 1¼ knots in October, 1948. The maximum rate of the tidal stream is about 1½ knots and the maximum out-going flow of about 2½ knots occurs about midway between higher high water at Miri and the following lower low water. The maximum in-going flow of about a quarter of a knot occurs about midway between lower low water at Miri and the following higher high water.

In the immediate approaches the outflow under water is apparent in the movement of floating debris, but there is little movement below a depth of about one foot.

Chart 2108.

Coast.—Light.—The coast between Tanjong Kidurong and Tanjong Batu, about 68 miles north-eastward, is fringed by rocky ledges, but it has not been examined. The most prominent object on this coast is Gunong Silungen, 1,300 feet (396m2) high, situated 18½ miles southward of Tanjong Batu.

Kuala Similajau lies close southward of Tanjong Similajau, which

Digitized by Google

Chart 2108.

is situated about 22 miles north-eastward of Tanjong Kidurong. About midway between Tanjong Similajau and Tanjong Payong, about 15 miles north-eastward, is Kuala Nyalau. Batang Suai, Batang Niah and Sungei Sibuti discharge between Tanjong Payong and Tanjong Batu. At Tanjong Batu there are some conspicuous cliffs.

Tanjong Lobang, about 18 miles north-north-eastward of Tanjong Batu, has yellow sandstone cliffs, about 100 feet (30^{m}5) high ; between them the coast is covered with dense jungle.

A light (*Lat. 4° 22′ N., Long. 113° 58′ E.*) is exhibited, at an elevation of 155 feet (47^{m}2), from a grey steel tower, 60 feet (18^{m}3) in height, on Tanjong Lobang. In 1946, the light was extinguished.

Bukit Lambier, 1,500 feet (457^{m}2) high, and prominent, is situated about 13 miles east-north-eastward of Tanjong Batu.

A shoal, with a depth of 16 feet (4^{m}9) over it, lies about 10 miles west-south-westward of Tanjong Lobang ; two patches, with depths of 27 and 33 feet (8^{m}2 and 10^{m}1) over them, lie, respectively, about one mile and 1½ miles north-north-eastward of this shoal.

Off-lying dangers. — Buoy. — A shoal, with a least depth of 6 feet (1^{m}8) over it, marked by a red conical buoy, lies about 4 miles west-south-westward of Tanjong Lobang, and a 9-foot (2^{m}7) patch lies about 2½ miles south-westward of the same point.

Current.—In May, a current setting west-north-westward, with a rate of one knot, was generally found in the offing ; close inshore the current frequently set south-westward.

Chart 2660b.

OUTLYING DANGERS AND BANKS. — Southern dangers. —Lydie shoal, a small coral patch, with a depth of 19 fathoms (34^{m}7) over it, and with from 25 to 27 fathoms (45^{m}7 to 49^{m}4) around, lies about 70 miles west-north-westward of Tanjong Kidurong.

Parsons shoal, with a depth of 13 fathoms (23^{m}8) over it, and James shoal, with a depth of 12 fathoms (21^{m}9), lie, respectively, about 14 miles eastward, and 16 miles east-north-eastward of Lydie shoal ; both are composed of coral, and are of small extent. During the North-east monsoon a distinct line of tide-rips may be met in the vicinity of, and westward of these shoals.

Chart 2107.

Acis shoals, discovered by H.M.S. *Acis*, in 1860, consist of two coral patches ; the south-eastern shoal, with a depth of 8¾ fathoms (16^{m}0) over it, lies about 33 miles north-westward of Tanjong Kidurong ; the north-western shoal, with a depth of 9¼ fathoms (16^{m}9) over it, lies about 6 miles farther north-westward.

Chart 2108.

A 9¾-fathom (17^{m}9) patch lies about 32 miles westward of Tanjong Batu ; another, with a depth of 10 fathoms (18^{m}3) over it, lies about 25 miles west-north-westward of the same point.

A bank, with a depth of 11 fathoms (20^{m}1) over it, lies about 13½ miles westward of Tanjong Lobang.

Chart 2660b.

South Luconia shoals.—South Luconia shoals, consisting of a number of coral reefs, lie west-north-westward of Tanjong Baram (page 102) ; they are steep-to, the sea breaks over them in places, and they can usually be seen from aloft.

Chart 1263.

Digitized by Google

Chart 2660b.

Herald reef (*Lat. 4° 58′ N., Long. 112° 35′ E.*), the southernmost shoal, situated about 86 miles west-north-westward of Tanjong Baram, is a small atoll reef about 4 cables in diameter, with depths of less than 3 fathoms (5^m5) over the reef, and 30 fathoms (54^m9) over the centre. This reef is steep-to and very difficult to discern.

Luconia breakers, which dry, and on which the sea breaks heavily, lie about 3½ miles north-eastward of Herald reef.

Stigant reef, situated about 9 miles west-north-westward of Herald reef, is horseshoe shaped, and has general depths of from 2½ to 6 fathoms (4^m6 to 11^m0) over it; a patch, with a depth of 16 feet (4^m9) over it, lies near its north-western extremity.

Richmond reef, with a least known depth of 16 feet (4^m9) near its centre, is a ridge about 2 miles long in a north-north-easterly and south-south-westerly direction; it lies about 2½ miles north-eastward of Luconia breakers.

A shoal, with a least depth of 4½ fathoms (8^m2), over it, coral, lies about 20 miles east-north-eastward of Herald reef.

Connell reef, with a least depth of 27 feet (8^m2) over it, lies about 6½ miles north-westward of Richmond reef.

The area between the South Luconia shoals has not been examined and other reefs may exist.

North Luconia shoals.—North Luconia shoals lie about 100 miles north-westward of Tanjong Baram and from 18 to 55 miles northward of South Luconia shoals; they were partly examined by H.M.S. *Rifleman*, in 1866, and found to consist of a great number of coral reefs and shoals with no safe passages between them. The channel between South and North Luconia shoals, and the area westward of the latter have not been examined.

Hayes reef, the southernmost of the North Luconia shoals, is a small steep-to reef which dries; the sea breaks heavily over it in all weathers.

Seahorse breakers, with a least depth of 1½ fathoms (2^m7) over them, are steep-to on their eastern side. They are situated about 10 miles northward of Hayes reef. A detached coral reef lies close southward, and a small patch, which dries, on which the sea breaks heavily, is situated about 2 miles westward of Seahorse breakers.

Friendship shoal, the northernmost of the Luconia shoals, has a least known depth of 4½ fathoms (8^m2) over it, but shoaler water may exist. The position of this shoal is approximately in lat. 5° 59′ N., long. 112° 32′ E.

Northern dangers.—Louisa reef, situated in lat. 6° 20′ N., long. 113° 14′ E., about 48 miles east-north-eastward of Friendship shoal, is composed of coral; it is from 4 to 6 feet (1^m2 to 1^m8) high. Close to this reef the depths are not less than 50 fathoms (91^m4).

Royal Charlotte reef lies about 42 miles north-north-eastward of Louisa reef; it is nearly rectangular in shape; near its south-eastern side are some boulders, from 2 to 4 feet (0^m6 to 1^m2) high, and some rocks, awash, lie on its north-eastern side.

Swallow reef lies about 27 miles north-north-eastward of Royal Charlotte reef. This reef is formed by a narrow belt of coral surrounding a shallow basin; near its eastern end there are some rocks, from 5 to 10 feet (1^m5 to 3^m0) high; there are also some rocks above water near its south-eastern side.

Ardasier reef, which is the western extremity of Ardasier bank, lies

Chart 1263.

Digitized by Google

Chart 2260b.

about 14 miles north-north-eastward of Swallow reef; the reef, which dries, encloses a shallow lagoon, which is probably accessible to boats at high water. This reef is steep-to except on its eastern side, where it joins Ardasier bank.

Ardasier bank extends about 35 miles east-north-eastward from Ardasier reef, and is surrounded by a fringe of coral. The least depth on the bank is 7 feet (2^{m}1).

Dallas reef, which dries, lies about 5 miles westward of Ardasier reef; the reef entirely encloses a small lagoon.

For dangerous ground northward and north-eastward of Ardasier bank, *see* pages 197-200.

Tidal streams.—In October, the tidal stream was observed to be setting west-north-westward near Louisa reef, at noon on full and change days.

Chart 1949.

Miri anchorage and approaches. — Dangers. — Lights. — About 1½ miles north-eastward of Tanjong Lobang is the entrance to Sungei Miri, on the south-eastern side of which is the town of Miri, one of the principal ports of Saráwak.

A range of coastal hills, about 300 feet (91^{m}4) high, extends about 4 miles north-north-eastward from Tanjong Lobang; northward of these the land is low, and where it has not been cleared, densely wooded.

The most conspicuous objects on the coast between Tanjong Lobang and Tanjong Baram, 14 miles northward, are the oil tanks at Miri, and those at Lutong, about 5½ miles farther northward. At night, the lights of the oil works are very prominent.

Sungei Miri, which, for the last 5½ miles of its course runs nearly parallel with the coast from northward, is obstructed at its mouth by a bar, with a depth of 2 feet (0^{m}6) over it, on which there is usually a dangerous sea. Small craft, with a draught of less than 6 feet (1^{m}8), can ascend the river for a distance of about 14 miles, above which it has not been examined.

Two pairs of leading beacons are situated on the southern side of the entrance to Sungei Miri; these beacons mark the channel across the bar which is subject to change, and sometimes only one pair is actually in use; at night, lights are exhibited from those beacons that are in use; the positions of these beacons are altered to meet changes in the channel across the bar. The best time to cross the bar is at high water. There is normally no swell in the offing during the South-west monsoon season, but there is always a surf on the bar.

A bridge crosses the river about 6 miles above the entrance; only small craft without a mast or a funnel can pass under it.

A light is exhibited, at an elevation of 96 feet (29^{m}3), from a grey column, 92 feet (28^{m}0) in height, at Lutong.

Pilots.—Qualified pilots for mooring vessels at the oil berths at Lutong are stationed at Miri.

Anchorage. — Directions. — Mooring buoys. — Vessels can anchor, in a depth of 5 fathoms (9^{m}1), about 3 miles north-north-westward of Tanjong Lobang (*Lat. 4° 22′ N., Long. 113° 58′ E.*); vessels making the port in thick weather, and unable to reach this anchorage, are recommended to anchor, in depths of from about 10 to 12 fathoms (18^{m}3 to 21^{m}9), rather than remain under way. Vessels discharging cargo anchor westward of a mooring buoy, which is situated nearly

Digitized by Google

Chart 1949.

2 miles westward of the entrance to the river, and secure their sterns to this buoy in order to keep head to swell. When at anchor off Miri, even in a gale with a high sea, vessels always lie head to the tidal stream with the swell on their beam.

A mooring buoy, painted red and equipped with a wire hawser, is laid about 3¼ miles west-north-westward of the entrance to the river; its function is to provide an anchored vessel with a stern wire to hold her head to the swell.

Approaching from westward vessels should steer for the oil tanks at Miri bearing 115°, and anchor as previously directed. In thick weather they should keep in a greater depth than 12 fathoms (21m9) until Tanjong Lobang (*Lat. 4° 22′ N., Long. 113° 58′ E.*) is sighted.

The anchorage can be made at night as the white painted oil tanks generally show up well.

Charts 1949, 2108.

Approaching from northward a berth of at least 5 miles should be given to Tanjong Baram, after passing which the foregoing directions should be followed.

Chart 2108.

Tidal streams.—During the South-west monsoon the stream in the offing sets more or less steadily northward along the coast from Miri to Tanjong Baram; northward of the latter the stream sets north-eastward and east-north-eastward. In the vicinity of Tanjong Baram the stream appears to be principally influenced by the wind. Within 5 miles of the coast the tidal streams are generally weak; the maximum rate experienced by H.M. Surveying Ship *Iroquois*, in November 1923, was half a knot, but rates up to 2½ knots are reported to occur.

Chart 1949.

Miri.—The population of Miri, in 1949, was about 19,000. A boat ferry connects the town with the western bank of the river.

Harbour facilities.—There is a Government wharf, 100 feet (30m5) long, with a depth of 10 feet (3m0) alongside at high water. There are also two small jetties, on one of which there is a crane with a lifting capacity of 3 tons.

There are two slipways for the use of lighters and launches. There is one Government tug. There is a diver and diving equipment. Water may be obtained alongside the slipway jetty.

There is a small sick quarters for Europeans and a hospital for natives.

Communication.—There is regular communication with Singapore, Labúan, and the ports of Saráwak and British North Borneo.

There is a radio station at Miri. *See* page 21.

Trade.—The principal exports are fuel oil, diesel oil, damar, rattan, and rubber; the chief imports are general foodstuffs and machinery.

Regulations.—The following are extracts from the port regulations, copies of which will be supplied to vessels by the pilot.

Any vessel, steam or otherwise, arriving at Miri direct from a foreign port must fly the quarantine signals described in the International Code of Signals, and these must not be hauled down until the vessel has been given pratique.

For radio signals to be made to the Port Health Officer by vessels proceeding to Lutong, *see* Admiralty List of Radio Signals.

No communication with the shore will be permitted, and no boat

Digitized by Google

Chart 1949.

or launch will be allowed alongside the vessel, nor will the vessel be allowed alongside any wharf until pratique has been obtained.

Vessels lying in the roads for quarantine should anchor as near as they can with safety to the anchorage off the mouth of Sungei Miri (*Lat. 4° 23′ N., Long. 113° 58′ E.*).

Vessels entering Sungei Miri must anchor in mid-stream, off the Customs wharf for inspection.

Vessels proceeding to Miri to load should anchor off Miri to pick up the pilot who will take them to the moorings off Lutong. The pilot will provide mooring wires, a gang of men to assist in mooring, and a launch.

Under no circumstances should a vessel anchor off Lutong unless in charge of a pilot. *See* also page 103.

Lutong.—A considerable quantity of fuel oil is kept in stock at Lutong. There are four oiling berths, where vessels anchor and secure to buoys, connected to the shore by 8 to 12-inch submarine pipe lines; the southern berth is in a depth of 28 feet (8^{m}5), and the northern berth in a depth of 36 feet (11^{m}0). At these berths oil can be delivered at 250 tons an hour. During the South-west monsoon oiling is seldom interrupted by the weather, but during the North-east monsoon interruptions from this cause are believed to be frequent. Oil can also be supplied to vessels at anchor by means of a 100-ton lighter.

Prohibited area and anchorage.—Navigation and anchorage in an area, indicated by pecked lines on the chart, off Lutong westward of the meridian of 113° 58′ E., is prohibited except when a vessel is in charge of a pilot.

Anchorage is prohibited in an area, also indicated by pecked lines on the chart, off Lutong eastward of the meridian of 113° 58′ E.; local small craft are, however, permitted to pass through this area.

Chart 2108.

COAST.—Light.—From Tanjong Baram a bank, with depths of less than 6 feet (1^{m}8) over it, extends about 3 miles westward and northward; a spit, which dries one foot (0^{m}3), on which the sea usually breaks, lies on this bank, and extends about 2 miles north-westward of the southern entrance point of Batang Baram.

A light (*Lat. 4° 36′ N., Long. 113° 58′ E.*) is exhibited, at an elevation of 120 feet (36^{m}6), from a white steel framework tower, on Tanjong Baram, on the northern side of the entrance to Batang Baram.

Batang Baram.—Batang Baram is navigable by vessels that can cross the bar for about 106 miles, and by launches possibly for another 25 miles to Long Lama. The principal tributary, Batang Tinjar, is navigable by launches for about 40 miles above its junction with the main river. About 26 miles above its mouth a canal connects Batang Baram with Batang Belait to the eastward.

Discoloured water, in which may be found huge floating logs and nipa palm roots, extends for about 4 to 8 miles seaward from the mouth of Batang Baram; the line of demarcation between sea and river water is generally very pronounced.

The bar has a depth of about 3 feet (0^{m}9) over it, and vessels with local knowledge of about 7-foot (2^{m}1) draught can enter the river in fine weather; in 1893, between the bar and Marudi, situated about 59 miles higher up, the river had depths of from 3 to 20 fathoms (5^{m}5 to 36^{m}6).

Charts 2660b, 1263.

Digitized by Google

Chart 2108.

Marudi is the principal town of the district and a Government station. There is regular steamer communication with Kuching and other ports in Saráwak.

Tidal streams.—The in-going stream seldom reaches Marudi; in April, 1849, the out-going stream was observed to be running continuously with a rate of about 3 knots.

Charts 2107, 2108.

Directions.—Between Tanjong Tatau (page 98) and Tanjong Baram vessels should keep in greater depths than 15 fathoms (27m4).

Charts 2660b, 1263.

Digitized by Google

CHAPTER V

NORTH-WEST COAST OF BORNEO—TANJONG BARAM TO TANJONG TULAK, INCLUDING LABUAN ISLAND

Chart 2109.

COAST.—Aspect.—For about 30 miles eastward of Tanjong Baram (*Lat. 4° 36′ N., Long. 113° 58′ E.*) the coast is very low and intersected by numerous creeks ; it is densely wooded by trees about 90 feet (27^{m}4) high.

Chart 2660b.

Mount Scott, about 33 miles east-south-eastward of Tanjong Baram, is an isolated and prominent whale-backed mountain, 1,725 feet (525^{m}8) high, rising from low flat country.

Chart 2109.

Bukit Ambok, 251 feet (76^{m}5) high, and covered with low scrub, lies near the northern bank of Sungei Tutong, about 4½ miles east-north-eastward of its entrance, which lies about 39 miles east-north-eastward of Tanjong Baram ; it is fairly prominent in contrast to the densely wooded country by which it is surrounded.

Chart 2660b.

Gunong Mulu, one of the highest mountains in this part of Borneo, lies about 68 miles east-south-eastward of Tanjong Baram ; it is conical shaped with a slightly flattened top, and rises to an elevation of 7,898 feet (2,407^{m}3). The two summits of Batu Trikkan, flat-topped cones with steep sides, 5,320 and 5,387 feet (1,621^{m}5 and 1,642^{m}0) high, respectively, lie northward of Gunong Mulu, but are not conspicuous.

There are several conical peaks of the Mulu range eastward of Gunong Mulu.

Climate and weather.—*See* page 22.

Chart 2109.

Coast.—Batang Belait (Balait) discharges about 12½ miles eastward of Tanjong Baram ; it is about 70 miles long and flows through densely forested swamps. Boats, with a draught of 5 feet (1^{m}5), can reach the village of Belait, about 18 miles above the entrance, where there is reported to be a pier. In 1923, there were general depths of about 2 fathoms (3^{m}7), with a depth of 4 feet (1^{m}2) on the bar ; the channel was obstructed by snags embedded in the mud.

Kuala Belait, on the right bank close within the entrance, is a town which has been developed as the headquarters of the Seria oilfields. It was reported, in 1950, to be difficult to distinguish until within 4 miles of it, when the oil company's buildings could be identified.

Chart 1263.

Digitized by Google

Chart 2109.

There are two piers, one of which is 90 feet (27m4) long, with a depth of 2½ feet (0m8) alongside, situated about three-quarters of a mile within the bar, and the Government pier, with a depth of 2 feet (0m6) alongside, abreast the town, about one mile farther up river. There are two cranes on the former pier, one with a lifting capacity of 20 tons and the other 6 tons.

Two pairs of leading beacons are situated on the western side of the entrance to Batang Belait. The outer pair is surmounted by a diamond daymark, and the inner pair by a triangular daymark. These beacons are liable to be moved without notice to conform with the deepest channel over the bar.

About 8 miles eastward of the entrance to Batang Belait are the "gushers," resembling pylons, of the oilfield at Seria, which are prominent and the glare from which shows up well at night. There are five piers here, the easternmost being 825 feet (251m5) long.

Sungei Tutong was, in 1913, navigable by very light draught vessels for about 14 miles to Dixon reach, above which it was blocked by fallen timber; the bar had, in that year, depths of from 3 to 4 feet (0m9 to 1m2) over it, and is continually shifting. The village of Tutong, in which is a Custom house and a post-office, is situated on the northern bank of the river about 8 miles from the entrance, close southward of Bukit Ambok.

Between Tanjong Baram and Sungei Tutong the coastal bank, with depths of less than 3 fathoms (5m5) over it, extends from half a mile to 2 miles offshore. Brock patch, with a depth of 15 feet (4m6) over it, lies about 5 miles westward of the mouth of Sungei Tutong, and 3 miles offshore.

Outlying dangers.—Chearnley shoal, with a least depth of 4 fathoms (7m3) over it, near its centre, lies with its shoalest part about 18 miles north-north-eastward of the entrance to Batang Belait (*Lat. 4° 35′ N., Long. 114° 11′ E.*). Two patches, with depths of 9 fathoms (16m5) over them, lie, respectively, 3¼ miles westward, and 1¼ miles north-north-westward of the shoalest part of this shoal.

Browne patch, of coral, with a least depth of 27 feet (8m2) over it, lies about 3½ miles north-north-westward of Chearnley shoal.

Porter patch, with a least depth of 6 fathoms (11m0) over it, lies about 5¼ miles east-north-eastward of Chearnley shoal.

Fairley patches, a narrow ridge of shoals, with a least depth of 5 fathoms (9m1) over them, lie with their southern end about 2 miles north-eastward of Browne patch.

Ampa patches lie from 1½ to 5 miles east-north-eastward of Fairley patches; the shallowest part of these shoals is a patch, with a depth of 4 fathoms (7m3) over it, known as Magpie rock, and there are several other shoals, with depths of less than 5 fathoms (9m1) over them. There are several shoals, with depths of from 5 to 10 fathoms (9m1 to 18m3) over them, close westward and south-westward of Ampa patches; the positions of these can best be seen on the chart.

Coast.—Between the entrance to Sungei Tutong and Brunei bluff, 35 feet (10m7) high, about 32 miles east-north-eastward, the coastal bank, with depths of less than 3 fathoms (5m5) over it, extends from half a mile to 1½ miles offshore. Between Sungei Tutong and Brunei cliffs, 19 miles north-eastward, the coast is sandy, and in most places backed by dull reddish cliffs, from about 40 to 60 feet (12m2 to 18m3)

Charts 2660b, 1263.

Digitized by Google

Chart 2109.

high, broken by occasional low beaches on which there are high casuarina trees, and by the mouths of numerous small rivers.

Brunei cliffs, from 80 to 90 feet (24m4 to 27m4) high, are composed of white sand with patches of short grass. Pulau Punyet, an islet, 60 feet (18m3) high, lies about half a mile north-westward of a point which lies close eastward of the cliffs; it is almost joined to this point by rocky ledges. A rock, awash, lies about 2 cables north-westward of the islet. Small craft can find shelter during the South-west monsoon eastward of the islet and ledges.

Sharp peak, or Mount Chevalier, 1,427 feet (434m9) high and very conspicuous, lies about 14 miles south-eastward of Bukit Ambok (page 106), and at the commencement of the mountainous country of the interior; it is usually visible when the higher mountains are covered with clouds.

Woody peak, 454 feet (138m4) high, situated about 3 miles south-westward of Brunei cliffs, is the highest peak of a range of hills, from 250 to 454 feet (76m2 to 138m4) high, which run parallel with the coast about one mile inland; it can be identified by a conspicuous clump of trees, 90 feet (27m4) high, close to its south-western side.

Bukit Sabandar, a grassy ridge with numerous indistinguishable sharp peaks, from 391 to 470 feet (119m2 to 143m3) high, extends southward from Brunei cliffs; from close eastward of this ridge the coastal range of hills, from 200 to 358 feet (61m0 to 109m1) high and densely wooded, trends east-north-eastward to Brunei bluff.

Bukit Loura, a sharp peak, 756 feet (230m4) high, situated about 10 miles south-westward of Brunei bluff, is conspicuous; it is the summit of a ridge which extends about 2½ miles north-eastward, and the same distance south-westward from it.

Chart 2134.

Jaja ridge, steep and wooded except for occasional clearings, lies close eastward of, and parallel with Bukit Loura; this ridge, which attains an elevation of 537 feet (163m7), terminates close south-westward of Brunei bluff.

Chart 1846, plan of Limbang estuary.

Bukit Buang Sakar, 767 feet (233m8) high, and Bukit Say, 738 feet (224m9) high, are two conspicuous wooded peaks, lying about 3¾ miles south-south-westward of Bukit Loura; the summit of Bukit Buang Sakar is sharp, that of Bukit Say is rounded.

Chart 2134.

Pisang hill (*Lat. 5° 01′ N., Long. 115° 03′ E.*), 540 feet (164m6) high, on the summit of which is a small beacon which is prominent when seen from Muara outer bar, lies about 2¼ miles south-south-westward of Brunei bluff; Cowie hill, 193 feet (58m8) high, lies on the same ridge about three-quarters of a mile southward of the latter.

Chart 2109.

Outlying dangers.—Buoy.—Victoria patches, consisting of a number of coral shoals, with depths of less than 3 fathoms (5m5) over them, lie from 3 to 4½ miles offshore; the shoalest patch, with a depth of 9 feet (2m7) over it, lies nearly 6 miles northward of Bukit Ambok. A 3-fathom (5m5) patch lies about 2 miles offshore and 7¾ miles south-westward of Pulau Punyet.

Scout patches consist of two shoals, of which the south-eastern, on

Digitized by Google

Chart 2109.

which lies Scout rock, with a depth of less than 6 feet (1m8) over it, lies 7¾ miles northward of Bukit Ambok, and the north-western, with a depth of 21 feet (6m4) over it, lies about 1¼ miles north-westward of Scout rock.

Cunningham patch, with a least depth of 21 feet (6m4) over it, lies about 10½ miles north-north-westward of Bukit Ambok; Blunt rock, with a depth of 15 feet (4m6) over it, lies about 9½ miles northward of the same hill.

Brunei patches consist of several shoals, with depths of less than 3 fathoms (5m5) over them; the shoalest spot, a rock with a depth of less than 6 feet (1m8) over it, lies about 7½ miles north-westward of Pulau Punyet.

Amcotts rock, with a depth of 27 feet (8m2) over it, lies about 14 miles northward of Bukit Ambok; a 33-foot (10m1) patch lies about 2¼ miles east-south-eastward of this rock.

Iron Duke shoals consist of three distinct shoals: Otterspool rock, the southernmost, with a depth of 13 feet (4m0) over it, situated about 15½ miles northward of Bukit Ambok; Nankivell rock, with a depth of 27 feet (8m2) over it, about 2 miles north-westward of Otterspool rock; and Silk rock, with a depth of 5 fathoms (9m1) over it, about 2½ miles north-eastward of Nankivell rock.

Littledale shoal, with a depth of 25 feet (7m8) over it, lies about 9 miles north-north-westward of Pulau Punyet (*Lat. 4° 59′ N., Long. 114° 51′ E.*); and Colombo shoal, with a least depth of 4 fathoms (7m3) over it, lies nearly 7 miles farther in the same direction.

Champion shoals, with several shoal heads, with depths of from 21 to 33 feet (6m4 to 10m1) over them, lie about 13 miles north-north-westward of Pulau Punyet. A conical buoy, surmounted by a staff, is moored on the eastern side of the shoal about one mile north-eastward of the shoalest part of the southern head.

Two Fathom rock, with a depth of 2 fathoms (3m7) over it, and composed of coral, lies about 6¼ miles west-north-westward of Brunei bluff; a 15-foot (4m6) patch lies about one mile farther in the same direction.

Chart 1844.

APPROACHES TO BRUNEI BAY.—The entrance to Brunei bay lies between Brunei bluff (page 107) and Tanjong Klias (page 113), about 23 miles north-eastward; the islands of the Labuan group stretch across the entrance and divide it into two main channels, one southward and one eastward of the islands. The channel eastward of the islands is known as East channel.

Western approach.—Islands and dangers.—Beacon.—Bethune head, 20 feet (6m1) high, the northern extremity of Labuan, lies about 8 miles north-westward of Tanjong Klias; foul ground with rocks, awash, on which the sea occasionally breaks, extends about 2 miles northward from this head.

The west coast of Labuan from Bethune head to Tanjong Layang Layangan, a cliffy headland, about 80 feet (24m4) high, 4¼ miles south-westward, and thence to Tanjong Punei, the south-western extremity of the island, consists of sandy beaches, inland of which the island is covered with trees and dense jungle, and from which rocks and coral reefs extend from half to one mile seaward; a prominent islet, 30 feet

Digitized by Google

Chart 1844.

(9m1) high, with, in 1912, a single tree on its summit, lies about half a mile south-westward of Tanjong Layang Layangan.

Between Bethune head and Tanjong Layang Layangan a range of hills, rising to an elevation of 336 feet (102m4), and covered with grass, runs parallel with the coast about half a mile inland. A densely wooded range of hills extends north-eastward from Tanjong Punei; Bukit Kalam, 273 feet (83m2) high, the northernmost and highest hill of this range, lies about 5 miles north-eastward of the point, and is conspicuous.

From Tanjong Punei, coral reefs, some of which are above water, extend nearly three-quarters of a mile south-westward, and a bank, with depths of less than 5 fathoms (9m1) over it, extends about 1¼ miles west-north-westward from this point.

Pulau Kuraman, 292 feet (89m0) high, lies about 2 miles south-westward of Tanjong Punei, from which it is separated by Kuraman channel; Undaunted rock, of coral, with a least depth of 2 fathoms (3m7) over it, lies in mid-channel between them.

Rusukan kechil (*Lat. 5° 12′ N., Long. 115° 09′ E.*), an islet, 151 feet (46m0) high, lies 8½ cables southward of the eastern extremity of Pulau Kuraman; a reef, with depths of less than 6 feet (1m8) over it, extends about 9 cables south-eastward from this islet.

Pulau Kuraman and Rusukan kechil lie on an extensive bank, near the south-western edge of which is a reef, which dries 3 feet (0m9); a detached shoal, with a depth of 4 fathoms (7m3) over it, lies about half a mile east-south-eastward of the south-eastern extremity of Pulau Kuraman.

Rusukan besar, on which there is a prominent clump of trees, 153 feet (46m6) high, lies about three-quarters of a mile south-south-westward of Rusukan kechil. Reefs and shoals surround this islet; a rock, one foot (0m3) high, lies near the south-western extremity of these shoals, about three-quarters of a mile south-south-westward of the south-western extremity of the islet. A shoal, with a least depth of 2 fathoms (3m7) over it, close southward of which is another, with a depth of 4½ fathoms (8m2) over it, lies about one mile east-south-eastward of Rusukan besar.

A bay, entered between Richardson point, situated about half a mile eastward of Tanjong Punei, and Hamilton point, 4¼ miles farther eastward, is encumbered with banks and reefs above and below water, extending nearly half a mile outside the line joining the entrance points.

Pulau Burong, 180 feet (54m9) high, and wooded, lies about 1½ miles east-south-eastward of Richardson point, and close within the edge of the bank, with depths of less than 6 fathoms (11m0) over it, extending from the southern side of Labuan.

Charts 947, 1844.

Enoe islet, 110 feet (33m5) high to the tops of the trees, lies 6 cables south-south-eastward of Hamilton point, on an extensive bank, which extends about 1½ miles south-south-westward from that point. Foul ground, with rocks, which dry from one to 4 feet (0m3 to 1m2), extends about 4 cables southward and 1¼ miles south-westward from the islet, and a rock, with a depth of less than 6 feet (1m8) over it, lies 1½ miles from it in the latter direction. Button islet, 23 feet (7m0) high, and covered with grass, lies about 1¾ cables south-eastward of Hamilton point. There is a boat channel southward of the islet.

Charts 2109, 2660b, 1263.

Digitized by Google

Charts 947, 1844.

Trident shoal, with a least depth of about 4 feet (1m2) over it, is composed of coral and sand; its shoalest part lies about 9 cables south-westward of Pulau Enoe. It is marked on its south-eastern side by a conical beacon, painted in red and yellow bands, 14 feet (4m3) in height, with a can topmark. Several patches, the shoalest of which has a depth of 3 fathoms (5m5) over it, lie about one cable west-south-westward of Trident shoal. The north-western extremity of Pulau Daät (page 113) in line with the south-eastern extremity of Pulau Pappan (page 113), bearing about 055°, leads south-eastward of Trident shoal.

Chart 1844.

Dangers off the western coast of Labuan.—Glayzer rock, composed of coral, with a depth of 5 fathoms (9m1) over it, lies about 12 miles west-north-westward of Bethune head.

Four Fathom patches consist of several small shoals, with a least depth of 4 fathoms (7m3) over them, lying about 3¾ miles north-westward of Bethune head.

An 8-fathom (14m6) patch lies about 8 miles north-westward of Bethune head, and a patch, with the same depth, lies 6½ miles northward of the head; between these two patches there are two patches with depths of 6 and 7 fathoms (11m0 and 12m8) over them. Several patches, with depths of from 6 to 8 fathoms (11m0 to 14m6) over them, lie about 5½ miles north-westward of Bethune head.

A shoal, with a least depth of 2 fathoms (3m7) over it, lies about 3¼ miles westward of Bethune head (*Lat. 5° 24′ N., Long. 115° 15′ E.*); a small detached shoal, with a depth of 3¾ fathoms (6m9) over it, lies about half a mile south-westward of its south-western end.

The above shoals and dangers are all steep-to; as others may exist in their vicinity, great caution should be exercised when navigating in these waters.

Dangers in fairway.—Buoyage.—Barat banks are two shoals consisting of coral and sand; the north-eastern bank has a least depth of 2¼ fathoms (4m1) over it, and lies about 3 miles south-westward of Pulau Kuraman; the south-western bank, with a least depth of 2½ fathoms (4m6) over it, lies about three-quarters of a mile farther in the same direction. These banks are separated by a channel, with a least depth of 5 fathoms (9m1) in the fairway.

A conical pillar light-buoy, painted white, exhibiting a *white flashing* light *every five seconds*, lies close southward of the south-western Barat bank.

A 5½-fathom (10m1) patch lies about 1¼ miles southward of Rusukan besar.

Chart 2134.

Pelong rocks are a group of sandstone rocks, the highest of which has an elevation of 73 feet (22m3), lying about 2 miles northward of Brunei bluff; both the bluff and the rocks are prominent when seen from Muara outer bar (page 118). Coral reefs extend about 3½ cables northward and 2½ cables south-eastward from the highest rock.

Chart 1844.

Abana rock is a coral patch, with a depth of 3 fathoms (5m5) over it, lying about 2 miles north-north-eastward of Pelong rocks; a red and white conical buoy is moored close northward of this rock, but it is liable to drift. Between Abana rock and Pelong rocks there are

Digitized by Google

Chart 1844.

several patches, with depths of from 7 to 9 fathoms (12m8 to 16m5) over them.

For Brunei bluff and coast westward of it, *see* pages 107-108.

Lights.—A light is exhibited, at an elevation of 215 feet (65m5), from a white tower with a red cupola, 50 feet (15m2) in height, on the summit of Pulau Kuraman.

Chart 947.

A light is exhibited, at an elevation of 23 feet (7m0), from a black wooden framework structure, situated on the eastern edge of the bank about 6½ cables north-eastward of Enoe islet.

Chart 2109.

Directions.—A vessel approaching Brunei bay from westward should give the off-lying dangers eastward of Tanjong Baram a wide berth, and approach, steering 124°; Woody peak, Pisang hill and Pulau Kuraman can be easily identified. In thick weather vessels should keep in greater depths than 25 fathoms (45m7) to ensure passing outside all dangers.

Vessels working against the monsoons will find the tidal streams more regular inshore, but with the east-going stream they should guard against the indraught into the several rivers.

Chart 1844.

The best channel by which to enter Brunei bay is between the red and white buoy marking Abana rock and Barat banks light-buoy. *See* views facing this page.

Vessels without local knowledge should not attempt to pass through Kuraman channel; Undaunted rock is not marked, and the tidal streams in the channel are sometimes very strong.

Current.—During the South-west monsoon the current off the west coast of Labuan was found to set continuously north-eastward, parallel with the coast, at a rate of from half to one knot; in November, with the change of the monsoon approaching, and with light winds, the current occasionally set south-westward.

East channel. — Island and dangers. — Beacons. — Buoys. — East channel is entered between Bethune head and Tanjong Tulak, about 8¼ miles eastward; it has a least depth in the fairway of 5¼ fathoms (9m6).

Tanjong Sakat (*Lat. 5° 23′ N., Long. 115° 22′ E.*), a thickly wooded point, lies about 2 miles south-westward of Tanjong Tulak; between them foul ground extends from three-quarters of a mile to one mile offshore. A shoal, with a least depth of 1¾ fathoms (3m2) over it, lies about 1¾ miles northward of Tanjong Sakat, and a rock, which dries 4 feet (1m2), lies 9 cables north-westward of the same point.

Pulau Lubidan, a cliffy islet covered with trees, the tops of which are about 50 feet (15m2) high, lies about 4 cables westward of Tanjong Sakat; both this islet and Tanjong Sakat are difficult to identify from westward.

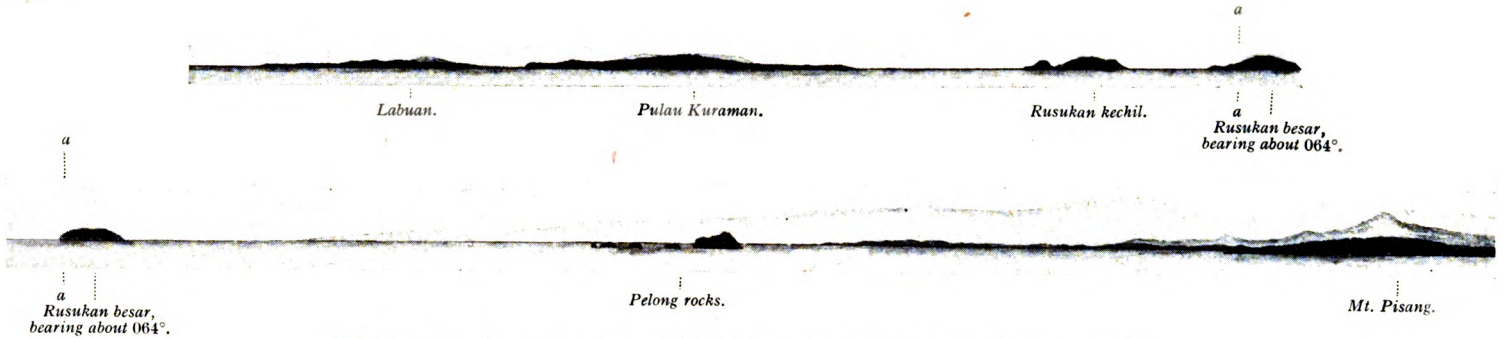
Kubong bluff, near which are the remains of a ruined pier, lies on the western side of the channel about half a mile south-south-eastward of Bethune head. There is a conspicuous chimney about half a mile west-south-westward of Kubong bluff.

Between Tanjong Sakat and Tanjong Liba, about 2½ miles southward, the coastal bank, with depths of less than 3 fathoms (5m5) over it, and which dries in places, extends about three-quarters of a mile

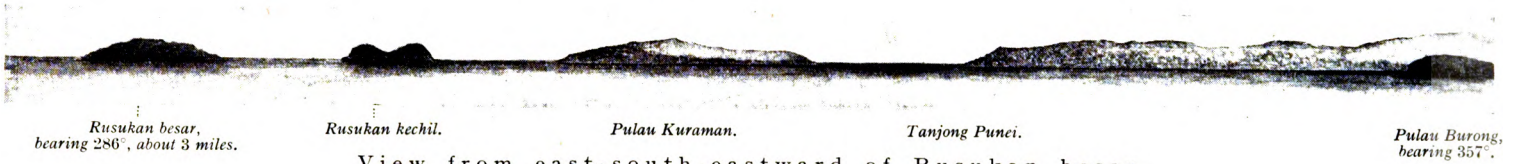
Charts 2660b, 1263.

Digitized by Google

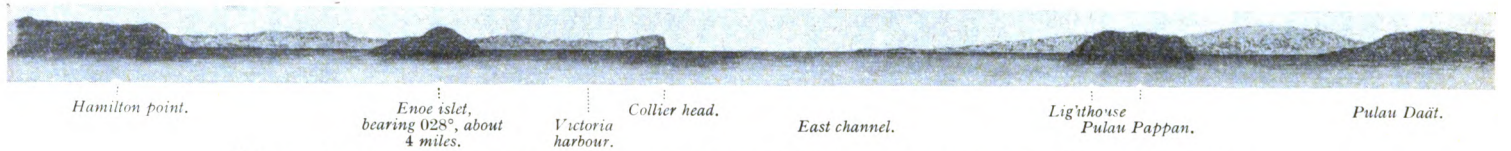
To face page 112.



View, in two parts, from westward of Pelong rocks.



View from east-south-eastward of Rusukan besar.



View from about 5 miles south-south-westward of the entrance.

Three views of the southern approach to Victoria harbour.

(*Originals dated* 1864.)

Digitized by Google

Digitized by Google

Chart 1844.

offshore, and thence to Tanjong Klias, about 3 miles farther south-south-westward, the bank extends more than 3 miles offshore; the outer edge of this latter part of the bank is fairly steep-to.

Between Kubong bluff and Collier head (Tanjong Taras), the south-eastern extremity of Labuan, a bank, with depths of less than 3 fathoms (5m5) over it, on which are some rocky ledges which dry, extends as much as 1¼ miles offshore; a conical buoy, painted in red and yellow vertical stripes, marking the eastern edge of the bank, is moored about 1½ miles north-eastward of Collier head.

Pulau Daät lies on the bank extending south-westward from Tanjong Klias, and is separated from that point by a channel marked by beacons and buoys, with a least depth of 6 feet (1m8). In 1916, the tops of the trees were about 300 feet (91m4) high, but it was then being cleared for planting.

From Pulau Daät the bank continues in a west-south-westerly direction for a further 2 miles; two rocks, 15 and 5 feet (4m6 and 1m5) high, respectively, lie on it about half a mile westward of Pulau Daät, and there are also several rocks, some of which dry from 3 to 6 feet (0m9 to 1m8), the positions of which can best be seen on the chart.

A red conical beacon, 15 feet (4m6) in height, with a white spherical topmark, marks the edge of the bank about 1½ miles south-south-westward of the south-western extremity of Pulau Daät.

Chart 947.

Pulau Pappan (*Lat. 5° 15′ N., Long. 115° 16′ E.*), about 2¼ miles west-south-westward of Pulau Daät, is flat and wooded; the highest tree, situated near the eastern end of the island, has an elevation of 148 feet (45m1); it is fringed by a reef which dries in parts, and extends from one to 3 cables offshore. Between the reef and the bank which extends west-south-westward, from Pulau Daät there is a narrow channel, with depths of from 3½ to 11 fathoms (6m4 to 20m1) in the fairway.

Between Collier head and Ramsay point, the northern entrance point of Victoria harbour, the coastal bank, with depths of less than 3 fathoms (5m5) over it, on which are some reefs which dry, extends about three-quarters of a mile offshore. A beacon, painted in red and white bands, 12 feet (3m7) in height, stands near the extremity of Ramsay point.

A conical buoy, painted in red and white vertical stripes, surmounted by a diamond, known as Columbine shoal buoy, lies near the outer edge of the bank described above, about 9½ cables southward of Collier head.

A conical beacon, No. 2, painted in red and yellow bands, 12 feet (3m7) in height and surmounted by a rectangle, stands near the southern edge of the bank, about 7 cables eastward of Ramsay point.

Signal station.—There is a signal station on Ramsay point.

Light.—A light is exhibited, at an elevation of 79 feet (24m1), from a white framework tower near the western end of Pulau Pappan.

Charts 1844, 2109, 2111.

Directions.—The following directions should be used with caution.

A good approach from north-westward is between Samarang bank (page 127) and Vernon bank (page 127); this channel is about 4½ miles wide with depths of more than 10 fathoms (18m3). Fury rocks, which lie near the middle of Vernon bank, are usually marked by breakers and

Digitized by Google

Charts 1844, 2109, 2111.

are the only visible means of identifying this shoal. Thence the route is south-westward of Mackenzie-Grieve shoals (page 127) and north-eastward of Four Fathom patches.

A vessel approaching from north-eastward along the coast should either use Tega channel (page 128) and thence pass between Jahat shoals and Pine Point shoals, thence north-westward of Iris shoals (page 126), or pass about 2½ miles northward and westward of Deluar shoals (page 128), thence between Nosong shoals and those westward of Pulau Tega, and thence south-eastward of Jahat shoals; vessels of deep draught are recommended to use the latter route.

Chart 1844.

From a position westward of Iris shoals, a vessel entering Brunei bay by East channel should steer for the summit of Pulau Daät, bearing 176°, until the summit of Pulau Pappan bears 195°, when she should steer for it on that bearing until the summit of Pulau Daät bears 164°. Thence she should steer to pass eastward of Collier head, and continue southward until the south-eastern extremities of Enoe islet and Rusukan besar are in line, bearing 238°, when she should keep on this alignment until the summit of Pulau Pappan (*Lat. 5° 15′ N., Long. 115° 16′ E.*) bears 180°, when she may enter Victoria harbour. Vessels without local knowledge should not attempt this passage at night.

Charts 1844, 2111.

H.M.S. *Kent*, in 1931, proceeded northward through East channel and westward of Iris shoals, steering 007°. When the 530-foot (161^{m}5) hill north-eastward of Tanjong Tulak bore 120°, course was altered and Mount Nosong steered for, bearing 074°, until Jahat rock beacon (page 127) bore 322°. From this position a north-easterly course was steered until Tangut rock bore 130°, after which the ship proceeded through Tega channel.

Chart 1844.

Labuan.—For the western and southern coasts of Labuan *see* pages 109-110, and for the eastern coast *see* page 113.

Labuan was re-united with British North Borneo in 1946.

The northern part of Labuan is comparatively high, but most of the southern part of the island is low, marshy and intersected by streams; a considerable area is covered with dense jungle and trees. When seen from a distance northward the island appears as two peaks of almost equal elevation.

The population of the island, in 1950, was 10,640, of whom 60 were Europeans.

Chart 947.

Victoria harbour. — Dangers. — Beacons. — Buoys. — For Trident shoal and Enoe islet, *see* pages 111 and 110, respectively.

Victoria harbour, which is well sheltered from both monsoons, is entered between Hamilton point (page 110) and Ramsay point (page 113); the depths in the entrance are from 5½ to 8 fathoms (10^{m}1 to 14^{m}6), decreasing gradually towards the head.

The limits of the harbour are defined as follows:—

On the east by a line from Collier head to the eastern extremity of Pulau Pappan, thence by the coast to the south-western extremity of that island, thence to the northern extremity of Enoe islet, and thence to Hamilton point.

Outer shoal, a coral patch with a least depth of 3 feet (0^{m}9), over it,

Charts 2660b, 1263.

Digitized by Google

Chart 947.

marked by a black beacon surmounted by a diamond shape, lies about 9 cables east-north-eastward of Enoe islet. It is marked on its south-western side by a white conical buoy.

Harbour shoal, with a least depth of 7 feet (2m1), coral, over it, and marked on its north-western side by a conical beacon, painted in black and white bands, 15 feet (4m6) in height, with a spherical top-mark, lies about 6½ cables south-south-westward of Ramsay point.

The western shore of the harbour is bordered by mangroves and indented by several small creeks. The coastal bank, with depths of less than 3 fathoms (5m5) over it, on which there are several rocks, some of which dry, extends about 2½ cables offshore; the inner part of this bank dries.

Between Ramsay point and Liberty pier, three-quarters of a mile westward, a sandbank, which dries, extends about one cable offshore. A conical beacon, No. 3, painted in red and yellow vertical stripes, 15 feet (4m6) in height, surmounted by a rectangle, stands on the edge of the bank, about 4½ cables westward of Ramsay point.

An obstruction, which dries 3 feet (0m9), lies about 200 feet (61m0) north-eastward of the pier.

For about 3 cables north-westward of Liberty pier this shore of the harbour is occupied by wharves; above this point the harbour opens out forming a basin nearly the whole of which dries.

Caution.—The buoys in Victoria harbour are sometimes temporarily replaced by buoys of a different description.

Anchorages. — Directions. — Vessels should moor, in suitable depths, clear of the fairway to the inner part of the harbour, with open hawse south-westward. The atmosphere in the harbour is sometimes oppressive and it may be preferable to anchor southward of Pulau Pappan, in depths of 10 or 12 fathoms (18m3 to 21m9), where the full strength of the land and sea breezes will be felt.

The man-of-war anchorage is in a depth of about 5½ fathoms (10m1), about 3½ cables south-south-westward of the Government flagstaff which is situated about 1½ cables eastward of Liberty pier.

Vessels in quarantine should anchor about half a mile northward of Pulau Pappan, eastward of the line drawn 000° from the lighthouse (*Lat. 5° 15′ N., Long. 115° 16′ E.*) on that island.

Vessels loaded with explosives should anchor within 4 cables north-westward of Enoe beacon.

Charts 947, 1844.

A vessel entering by the western channel, from a position midway between Barat bank light-buoy and Abana rock buoy (page 111), should steer eastward until Pulau Pappan lighthouse bears about 050°, when she should steer for it on that bearing until Ramsay point bears 012°, when she should steer for it on that bearing, which leads between Outer shoal and the reef extending eastward from Enoe islet; thence she should pass between Enoe beacon and Harbour shoal into the harbour. Vessels without local knowledge should not enter at night.

Prohibited anchorage.—On account of submarine telegraph cables, anchorage is prohibited within the area southward of Ramsay point indicated by pecked lines on the chart.

Town.—The town of Victoria is the seat of government for the group of islands between Malaya and the region lying around Brunei bay. The population of the town, in 1931, was 2,022.

Charts 2109, 2660b, 1263.

Digitized by Google

Charts 947, 1844.

Harbour facilities.—There are two small jetties, with depths of 14 feet (4m3) alongside and two landing pontoons, at the western end of the town; eastward of these are Marine jetty, with a depth of 17 feet (5m2) alongside, and Liberty pier, which has a T-head, 360 feet (109m7) in length, with a depth of 20 feet (6m1) alongside.

The best landing place is at Liberty pier, which is available at all states of the tide; care should be taken, however, to avoid submerged piles in the vicinity.

Fresh provisions are obtainable, but notice should be given if a large quantity is required. Water and fuel oil are laid on to the pier, and a small quantity can be provided if sufficient notice is given.

There is a Government hospital, but it has no accommodation for Europeans.

Trade.—Shipping.—The principal crops are sago, rubber, copra and jelutong.

In 1949, 1,632 vessels, with a gross tonnage of 621,609 tons, entered the harbour.

Communication.—Radio station.—There is regular communication by steamer with Singapore, Kuching, Miri, Kudat, Jesselton and Sandakan, and occasional communication with Brunei.

There is a regular and frequent air service with Singapore, Jesselton and Kuching. The Hong Kong–Australia air service calls at Labuan. Labuan is connected to the general telegraph system.

There is a radio station, *see* page 21.

Caution.—Owing to the presence of crocodiles in the harbour, bathing is dangerous except at the bathing compound.

Chart 2134.

BRUNEI BAY.—Dangers.—Beacons.—Polompong point (*Lat. 5° 02′ N., Long. 115° 07′ E.*), the north-western entrance point of Sungei Brunei, lies on the southern side of the entrance to Brunei bay about 3½ miles eastward of Brunei bluff; it is composed of sand, is nearly awash at high water spring tides, and is covered with drift wood. A compact grove of palms and casuarina trees, from 70 to 100 feet (21m3 to 30m5) high, extends westward from Polompong point for a distance of 1¾ miles; between this position and Brunei bluff the coast is low and covered with trees about 60 feet (18m3) high.

A beacon, consisting of a drum, painted red and white, on an iron pipe, about 37 feet (11m3) high, stands on Polompong point.

Muara spit, composed of sand, extends about 3½ miles east-north-eastward from Polompong point; for about 1¼ miles eastward from the point this spit is awash, thence the depths increase, by a series of irregular banks, to 15 feet (4m6) at its outer end. The outer end of Muara spit is usually marked by tide-rips.

Tanjong Gosok, a low point, covered with trees, about 80 feet (24m4) high, is the north-western extremity of a promontory of the mainland, and the south-eastern entrance point of Sungei Brunei, situated about 6½ miles south-eastward of Polompong point. The coast in the vicinity of the point is soft mud fringed with mangroves through which numerous streams discharge; some distance inland the land rises to an elevation of about 150 feet (46m7).

Sunda spit, composed of sand and mud, which dries, extends about 2¾ miles north-westward from Tanjong Gosok; from its north-eastern

Charts 2109, 2660b, 1263.

Digitized by Google

Chart 2134.

side Sunda bank, with depths of less than 3 fathoms (5m5) over it, extends about 5½ miles north-north-eastward. Sunda islet lies close offshore about 1¼ miles eastward of Tanjong Gosok.

A beacon, consisting of a drum, painted red and white, on an iron pipe, about 37 feet (11m3) high, stands on Sunda spit, about 2 miles north-westward of Sunda point.

Chart 1844.

Between Sunda islet and Bukit Sari, a small peninsula, 460 feet (140m2) high, about 10 miles eastward, the coast forms a bay, into which flow several rivulets. This peninsula is often rendered inconspicuous by the higher land within. The coastal bank, with depths of less than 3 fathoms (5m5) over it, extends from three-quarters of a mile to 1¾ miles offshore from this part of the coast.

A one-fathom (1m8) patch lies about 1¼ miles offshore and 1¾ miles south-westward of Bukit Sari (*Lat. 4° 56′ N., Long. 115° 23′ E.*).

Between Sari and the mouth of Sungei Sipitang, 12½ miles north-eastward, and thence to the southern entrance point of Padas bay, about 3½ miles northward, the coastal bank, with depths of less than 3 fathoms (5m5) over it, and which dries in places, extends from about half a mile to 1¾ miles offshore. A rock, with a depth of less than 6 feet (1m8) over it, lies about one mile offshore and 2¾ miles west-south-westward of the mouth of Sungei Sipitang; a shoal, with a depth of 9 feet (2m7) over it, lies about a quarter of a mile westward, and one with a depth of 2¼ fathoms (4m1) over it, lies 3½ cables south-south-eastward of this rock.

Batang Lawas, entered about 2 miles north-eastward of Sari, is navigable by small craft for a considerable distance; the entrance channel across the flats was, in 1948, marked by small wooden posts. At Lawas, which stands about 11 miles up the river, there is a Saráwak Government station. There is a wooden pier, with a depth of 12 feet (3m7) alongside.

Sungei Mangalong, which is navigable for small boats, discharges about 3 miles north-eastward of Batang Lawas. The coast between Sungei Mangalong and the entrance to Sungei Sipitang, about 7 miles north-eastward, forms a bay with a sandy shore and occasional rocky promontories, the principal of which are Tanjong Marantongan, Tanjong Sebuboh and Tanjong Marintaman, lying about 2¼, 4½, and 6 miles, respectively, from Sungei Mangalong.

Takat besar, a group of rocks, with a least depth of 3 feet (0m9) over it, lies 1¼ miles north-westward of Tanjong Sebuboh. Passage between these rocks and the coast is foul and should not be attempted. Takat Mengal, a rocky ledge, with a least depth of 1½ fathoms (2m7) over it, near its outer extremity, extends 3½ cables northward from Tanjong Marintaman.

Sungei Sipitang is a small river, at the mouth of which there is a large village of the same name. A boat channel, with a least depth of one foot (0m3), marked by perches, leads to a small landing stage.

Anchorage may be obtained, in a depth of 6 fathoms (11m0), with good holding ground of mud, three-quarters of a mile offshore. A vessel should approach the flagstaff at Sipitang, bearing 110° and anchor when Tanjong Marintaman bears 200°.

Padas bay, formed by the mouths of the Sungei Padas, is situated at the north-eastern end of Brunei bay; it is encumbered with sand

Charts 2109, 2660b, 1263.

Digitized by Google

Chart 1844.

and mud flats which dry, amongst which run the channels formed by the numerous small rivers which discharge into it.

The main channel of Sungei Padas to Weston, situated about 2½ miles north-eastward of Batu Batu, which lies 6½ miles northward of the mouth of Sungei Sipitang, was reported, in 1945, to have a least depth of 6 feet (1m8) at the entrance, and 5 feet (1m5) on the bar near Weston. Many of the charted beacons no longer exist, but the channel was reported, in 1945, to be adequately marked by buoys and beacons. Weston is connected to the British North Borneo railway and telegraph systems. There is a jetty, about 30 feet (9m1) long, at Weston, connected to the railway.

Between Padas bay and Tanjong Klias (page 113), the north-eastern shore of Brunei bay is flat, fringed with mangroves and intersected by numerous rivers; the country inland is covered with jungle. From this stretch of coast, flats, the greater part of which dry, extend from one to 3½ miles offshore.

Sungei Klias is entered about 1½ miles eastward of Tanjong Klias. The entrance to this river is obstructed by a flat, which dries about 3 feet (0m9), and divides the channel into two, the main channel passing close southward of Tanjong Klias. There is a least depth of 6 feet (1m8) over the bar, and the same depth can be carried for several miles within the entrance. In the channel from southward there is a depth of one foot (0m3). In September, 1870, H.M.S. *Algerine*, drawing 8 feet (2m4), proceeded up the river as far as Klias village, about 23 miles above its mouth.

Malankassan, Malankassan Dammit, and Pulau Sarangtiong, small islets covered with mangroves and ti-trees, lie on the flat described above, and are situated, respectively, about half a mile and one mile south-south-eastward, and 1½ miles eastward of Tanjong Klias. Two beacons mark the channel north-eastward of Pulau Sarangtiong.

Menpakul village is situated on the southern part of Tanjong Klias, at the entrance to Sungei Klias; there are two landing jetties here, and a flagstaff. This village is connected to the British North Borneo telegraph system. A District officer is stationed at Menpakul.

Caution.—For a considerable distance from this coast, dead trees and logs of wood are to be met with; after heavy rains in the interior miniature islands of trees and earth float down the rivers and eventually, find their way out to sea.

Charts 2134, 1844.

SUNGEI BRUNEI AND APPROACHES.—Buoy.—Beacon.—The estuary of Sungei Brunei, into which also flow Batang Limbang and several smaller rivers, is entered between Polompong point (*Lat. 5° 02′ N., Long. 115° 07′ E.*) and Tanjong Gosok; the entrance channel between Sunda spit and the shoals south-eastward of Muara spit is about 11 cables wide, with depths of over 18 feet (5m5).

The outer bar, situated about 5½ miles eastward of Polompong point, had, in 1946, a least depth in the fairway of 24 feet (7m3), but there are several patches, with depths of 17 and 18 feet (5m2 and 5m5) over them, lying northward of the recommended track shown on chart 2134; within the outer bar the depths on the recommended track increase to 47 feet (14m3) near Sapo point, the eastern extremity of Pulau Muara, situated about 3 miles south-south-eastward of Polompong point.

Charts 2109, 2660b, 1263.

Digitized by Google

Charts 2134, 1844.

The passage of the bar is considered to be safe for vessels of 23 feet (7m0) draught, in clear weather, at three-quarters flood; vessels of deeper draught should not attempt the passage unless the shoals have been previously buoyed.

A beacon, consisting of a drum, painted red and white, on an iron pipe, 137 feet (11m3) high, stands on Sapo point.

Pulau Muara, which shelters Muara harbour from eastward, lies about 2 miles southward of Polompong point, from which it is separated by Anson passage; this island is flat, marshy, and wooded in places with trees from 60 to 100 feet (18m3 to 30m5) high, which are densest near its eastern end.

Between Sapo point and Kramati point, 9½ cables north-north-westward, and thence to Ledong point, the northern extremity of Pulau Muara, the northern side of the island is bordered by a prominent sandy beach, and fringed by a bank, with depths of less than 6 feet (1m8) over it, the inner part of which dries, extending about 2 miles north-eastward and 8½ cables northward.

Chart 2134, with plan of The Outer anchorage and Muara bar.

Between Sapo point and Bowong point, about 2¼ miles westward, the southern side of Pulau Muara is fringed by a bank of mud and sand extending, with depths of less than 18 feet (5m5) over it, from 1½ to 3½ cables offshore, thence to Ledong point it extends from one to 4 cables offshore. The latter stretch forms the eastern side of Muara harbour.

There are several piers in a bad state of repair close westward of Sapo point.

Anchorage.—Directions.—Good anchorage may be obtained, in depths of from 8 to 9 fathoms (14m6 to 16m5), about 4½ cables south-south-westward of Sapo point.

Charts 2134, 1844.

A vessel entering Brunei bay from westward, having passed northward of Pelong rocks, should steer eastward with these rocks astern, bearing 270°, until the north-eastern extremity of Rusukan besar is in line with the south-western extremity of Pulau Kuraman, bearing 332°, when she should steer 175° for one mile, with Pulau Burong nearly astern, and keeping Rusukan besar bearing less than 337°; she should continue southward keeping the angle between Pisang hill (page 108) and the summit of Pelong rocks about 24° 30′ in order to avoid the sand knolls on the outer bar on the west, and Sunda bank on the east. The angle should not be less than 23° 30′ nor more than 24° 30′ until Sapo point bears 244° and the western extremity of Rusukan besar bears 336°; thence she should keep Sapo point bearing 244° until it is distant rather more than one mile (*see* view A on chart 2134), when she should steer for the anchorage.

It was reported, by H.M.S. *Flora*, in 1909, that Pulau Churmin (page 121), open about 1¼ times its own apparent breadth south-eastward of Sapo point, is a good mark for vessels leaving the estuary, but these marks cannot always be identified when entering.

A vessel drawing less than 20 feet (6m1) proceeding from Labuan to Brunei, having passed between Pulau Pappan (*Lat. 5° 15′ N., Long. 115° 16′ E.*) and Enoe islet, should steer about 200°, keeping the western extremity of Pulau Pappan bearing more than 022°, until Pelong rocks bear about 270°, and thence proceed as above.

Charts 2109, 2660b, 1263.

Digitized by Google

Chart 2134.

A vessel of 17 feet (5m2) draught can cross the outer bar with Sapo point in line with the distant peak southward of Kindana hill, bearing 228° (*see* view C on chart 2134). This alignment leads close south-eastward of the edge of the bank which extends north-eastward from Sapo point; when this point is distant about 2 miles the vessel should steer to pass about 2 cables from it, and thence for the outer anchorage.

Muara harbour. — Beacons. — Anson passage, the northern channel leading to Muara harbour, is unmarked and only available for small vessels with local knowledge; the least charted depth in the fairway is 7 feet (2m1), but, in 1924, this channel was reported to be silting up.

The common approach to Brunei channel and Muara harbour lies between the southern side of Pulau Muara and the northern end of the Rambler banks, which lie about half a mile southward; from its entrance the channel trends westward for about 2 miles to Muara bar, which lies about 2 cables south-westward of Tanjong Bowong.

Muara bar, composed of soft mud, and on which there is always smooth water, had, in 1946, a least depth in the fairway of 13 feet (4m0), but at the shoalest part the channel is very narrow; it is navigable by vessels of 15-foot (4m6) draught during the second half of the flood tide. A vessel of 17 feet (5m2) draught has crossed this bar. The channel is marked by two beacons, consisting of iron posts, surmounted by boards, painted white on the fairway side and red on the side facing the shoals; the beacon on the north-eastern side of the channel is situated about 1½ cables south-westward of Bowong point, and that on the south-western side about 3½ cables south-south-westward of the same point.

Muara harbour lies between Pulau Muara and the mainland westward; the harbour has depths of from 3 to 8½ fathoms (5m5 to 15m5), mud, and is completely sheltered. At the village of Brooketon, on the north-western shore, there are four piers and two small slipways, which, in 1946, were all badly damaged. In 1947, there was a depth of 7 feet (2m1) alongside the seaward pier. Small quantities of fresh provisions may be obtained from the village. There is a good road between Brooketon and Brunei, a distance of about 16 miles.

The village of Serasa is situated on the western side of the harbour about one mile southward of Brooketon.

Anchorage.—Directions.—Vessels can anchor off Brooketon, in depths of from 7 to 8 fathoms (12m8 to 14m6), mud.

Chart 2134, with plan of The Outer anchorage and Muara bar.

From the anchorage off Sapo point a vessel should steer westward along the south coast of Pulau Muara, keeping from about 3 to 3½ cables offshore, to a position about 1½ cables northward of the red and white beacon on the northern side of Rambler banks, situated about 6 cables south-eastward of Bowong point; thence she should steer to pass about half a cable south-westward of the beacon standing about 1½ cables south-westward of Bowong point, and thence steer for Serasa village, bearing 302°, until within half a mile of it, when she should alter course northward and steer for the anchorage off Brooketon.

Charts 1846, plan of Limbang estuary, 2134.

Sungei Brunei. — Light. — Dangers. — Beacons. — Between Tanjong Gosok (*Lat. 4° 58′ N., Long. 115° 12′ E.*) and Tanjong Salirong, about 7 miles south-westward, the eastern shore of the estuary is com-

Charts 1844, 2109, 2660b, 1263.

Digitized by Google

Charts 1846, plan of Limbang estuary, 2134.

posed of mangrove swamps, intersected by numerous rivers and is entirely featureless; the coastal bank, the inner part of which dries, extends, with depths of less than 3 fathoms (5m5) over it, from half a mile to 4 miles offshore.

Chart 2134.

Batang Trusan, entered about a quarter of a mile south-westward of Tanjong Gosok, is 45 miles in length, and rises near the source of Batang Limbang. Small steam vessels of about 6 feet (1m8) draught, could, in 1888, enter this river at high water.

Between the western entrance point of Muara harbour and a mangrove point about 2 miles south-south-westward the coast forms a bay almost all of which dries; at high water boats can navigate this bay as far as the western side of Pisang hill (page 108).

Pulau Badu Kang, 105 feet (32m0) high, densely wooded and surrounded by mangrove swamps, lies in the south-eastern approach to the bay described above, about 1½ miles southward of Serasa village; it is fringed by mud and sandbanks, by which it is joined to the mainland south-westward, and which also extend about half a mile eastward from its northern extremity. Oyster rocks, 2 feet (0m6) high, lie on the south-western part of the bank south-westward of Pulau Badu Kang.

River point, the eastern entrance point of Sungei Brunei and 4 miles south-south-westward of Pulau Badu Kang, may be identified by Kindana hill, situated about one mile south-south-westward; this hill is densely wooded, and is surmounted by a conspicuous clump of trees, the tops of which are at an elevation of 516 feet (157m3) high.

Chart 1846, plan of Approaches to Sungei Brunei.

Pulau Kingaran, the tops of the trees of which are about 120 feet (36m6) high, and densely wooded, lies about 2¼ miles south-westward of Pulau Badu Kang; it is separated from the mainland westward by a narrow channel, with depths of from 21 to 33 feet (6m4 to 10m1).

The northern end of the island consists of mangrove swamps, and the actual coastline is not visible; from this end Kingaran spit, composed of sand and mud, which dries from one to 2 feet (0m3 to 0m6), extends about 8½ cables east-north-eastward.

The southern end of the island consists of prominent rocks, and from it boulders extend to Peaked rock, 2 feet (0m6) high, which lies about one cable southward. There are some palm trees and a few native huts close to the landing place on the western side of Pulau Kingaran, but these are not visible from seaward.

A group of rocks, some of which dry, lie about one cable eastward of the southern extremity of Pulau Kingaran; shoals, with depths of less than 6 feet (1m8) over them, extend 1¾ cables east-south-eastward from the northern of these rocks, terminating in a narrow rocky spit named Batu Pintu.

Pulau Churmin, 110 feet (33m5) high to the tops of the trees and densely wooded, lies nearly half-a-mile north-north-eastward of River point (*Lat. 4° 55′ N., Long. 115° 01′ E.*). Landing on this island is practically impossible owing to the dense jungle, which is reputed to abound with snakes; crocodiles are also prevalent in the vicinity. A prominent rock lies close to the north-western extremity of the island.

A light is exhibited, at an elevation of 15 feet (4m6), from a framework

Charts 1844, 2109, 2660b, 1263.

Digitized by Google

Chart 1846, plan of Approaches to Sungei Brunei.

beacon, situated about 5 cables north-eastward of the north-eastern extremity of Pulau Churmin (*Lat. 4° 56′ N., Long. 115° 02′ E.*).

Churmin rock, with a depth of less than 6 feet (1m8) over it, lies about half a cable northward of the prominent rock mentioned above.

Chart 2134.

Rambler banks, which dry in places and on which there are numerous fish weirs, extend about 7 miles north-eastward from River point. Bowong point in line with Pisang hill, bearing about 290°, leads close northward of the banks.

Chart 1846, plan of Limbang estuary.

Pulau Baru-Baru consists of two islets, which lie on the inner part of Rambler banks, about 1½ miles eastward of Kindana hill. The northern islet is flat and densely wooded, the trees being about 100 feet (30m5) high; the southern islet is flat and densely wooded except near its southern end where a bare hill, on which there is a single tree, rises to an elevation of about 200 feet (61m0).

Chart 2134.

Brunei channel is entered close south-eastward of Muara bar (page 120), whence, with a width of from 1½ to 2 cables and a least depth of 19 feet (5m8), it trends south-westward for about 4 miles to abreast Kingaran spit (*see* above). Vessels drawing 18 feet (5m5) can ascend Brunei channel as far as Kingaran spit, but except in an emergency, it is recommended that vessels drawing more than 15 feet (4m6) should not proceed beyond the anchorage off Sapo point.

Chart 1846, Approaches to Brunei river.

Brunei inner bar extends from Kingaran spit to Pulau Churmin and forms the chief obstacle in the approach to Brunei. The principal shoals composing this bar are North Bar bank, with a least depth of 3 feet (0m9) over it, situated about 3½ cables south-eastward of Pulau Kingaran; South Bar bank, with a least depth of 3 feet (0m9) over it, which lies about one cable farther in the same direction; and the Barrier, which almost crosses the channel close south-westward of the two banks. There are fishing stakes on both North Bar and South Bar banks.

The Barrier, an ancient obstruction composed of rocks and boulders cemented together in places by marine growths, dates back probably about 300 years to the time of the Chinese occupation; off its southern end is a remarkable hole in which there is a greatest depth of 71 feet (21m6).

Simpson channel, the south-eastern channel over Brunei inner bar, lies between North Bar bank and South Bar bank. This channel is nearly straight, about one cable wide, and has a least depth in the fairway of 7 feet (2m1); it is not buoyed, but the fishing stakes on either side are visible at all states of the tide. The channel, which has widened considerably of late years, is subject to alteration in direction, but the depths appear to be fairly constant. H.M.S. *Herald* obtained a least depth, presumably at high water, of 14½ feet (4m4), when surveying this area in 1927. Vessels of 15-foot (4m6) draught can safely cross the bar at highest spring tides; local vessels frequently cross with their keels in the mud.

From the southern end of Simpson channel a narrow and tortuous passage, with a least depth in the fairway of 8 feet (2m4), in 1927,

Digitized by Google

Chart 1846, Approaches to Brunei river.

and with rocks, with depths of less than 6 feet (1m8) over them, on either side, leads between South Bar bank and the Barrier.

The channel over Brunei bar, between North Bar bank and Kingaran spit, was reported, in 1927, to be no longer in use.

A beacon, consisting of a pole, surmounted by a barrel, painted white and red, is situated on the eastern side of the Barrier, about 4 cables north-eastward of the northern extremity of Pulau Churmin (*Lat. 4° 56′ N., Long. 115° 02′ E.*).

A beacon, similar to the above, is situated near the southern end of the Barrier, about 2 cables east-north-eastward of the northern extremity of Pulau Churmin.

A beacon, similar to the above, is situated near the south-western extremity of South Bar bank, about 3 cables east-north-eastward of the northern extremity of Pulau Churmin.

The white side of the above beacon is towards the channel.

Pilots.—There are no licensed pilots for Sungei Brunei, but it is not difficult to obtain men capable of acting as pilot. The masters of several small steamers, who trade between Brunei and Labuan, are acquainted with the channel.

Anchorages.—Directions.—Vessels not intending to cross Brunei bar should anchor, in a depth of about 20 feet (6m1), mud, about 9 cables eastward of the northern extremity of Pulau Kingaran.

Chart 1844, plan of Sungei Brunei.

There is good anchorage, in a depth of 7 fathoms (12m8), off the Sultan's palace, with sufficient room for a vessel, 170 feet (51m8) long to swing. In 1911, H.M.S. *Clio* anchored in the fairway off Sungei Kianghi, in a depth of 6 fathoms (11m0), mud; she reported that there is also suitable anchorage off the Residency.

Charts 1846, plan of Approaches to Sungei Brunei, 2134.

From a position about 4 cables eastward of the beacon on the south-western side of Muara bar, with the summit of Pulau Churmin in line with Bukit Say, bearing about 230° (*see* view B on chart 2134), a vessel should steer 240° until Pisang hill bears 303°, when she should steer 233° in mid-channel until the South Bar bank light-structure is in line with Bukit Buang Sakar, about 7½ miles south-westward, bearing about 225°, when she should keep on this alignment, which leads through Simpson channel, and pass about 60 yards (54m9) west-north-westward of the light-structure; thence she should steer 209° and pass south-eastward of the beacon marking the eastern side of the Barrier, and midway between the beacons marking the southern extremities of South Bar bank and the Barrier; the vessel should alter course close round the latter to 295°, which passes about 1½ cables northward of Pulau Churmin and clear of Churmin rock.

When passing through the channel south-westward of Simpson channel the vessel should keep in mid-channel between the beacons, and on no account haul over to either side; no vessel should enter this channel if there is any prospect of having to pass another vessel in it. No vessel should proceed southward from Muara bar unless Bukit Say, Bukit Buang Sakar and Pulau Churmin are plainly visible.

Chart 1844, plan of Sungei Brunei.

After passing westward of Churmin rock (*Lat. 4° 56′ N., Long. 115° 02′ E.*) a south-westerly course should be steered into the river, keeping close to the western bank where the depths are greater. No

Digitized by Google

Chart 1844, plan of Sungei Brunei.

further directions can be given other than that vessels should pass westward of the two beacons situated westward of Pulau Sibungor, situated 5 miles south-westward of River point, and that, owing to tidal whirls and eddies, great care is necessary.

Chart 2134.

A vessel leaving Sungei Brunei should not alter course eastward and approach the end of the Barrier until the northern end of Pulau Baru-Baru (page 122) opens northward of Pulau Churmin.

Tidal streams.—In Brunei channel abreast Muara bar the tidal streams sometimes set across the fairway; in the remainder of this channel they set up and down the fairway. In Simpson channel the in-going stream has a rate of 2 knots and the out-going stream about 3 knots.

Off Sapo point the in-going stream commences about a quarter of an hour after low water at Labuan and about $5\frac{3}{4}$ hours before higher high water at that place. Their mean rates are about three-quarters of a knot and about $1\frac{1}{4}$ knots at springs, respectively.

The stronger out-going stream commences about 35 minutes after higher high water at Labuan; its mean rate is about $1\frac{1}{4}$ knots and from 2 to $2\frac{1}{2}$ knots at springs. The weaker out-going stream commences about $7\frac{1}{4}$ hours after lower low water at Labuan; its rate is from a quarter to half a knot.

Chart 1844, plan of Sungei Brunei.

Brunei.—The town of Brunei, in which the Sultan of Brunei resides, situated about 9 miles above the inner bar, had, in 1939, a population of about 12,000.

A British Resident is stationed here.

The old native town is built on mud flats in the river, the houses standing on piles in 3 or 4 feet (0^m9 or 1^m2) of water. The new town, containing the Government buildings, is situated on the north bank.

There is regular steamer communication with Labuan; there is a local telephone service.

There is a Government hospital in which a few beds might be available for Europeans. Fresh provisions can be obtained.

Trade.—*See* page 2.

Charts 1846, plan of Limbang estuary, 2134.

Batang Limbang and approaches.—The approach to Batang Limbang, southward of Sapo point (*Lat. 5° 00′ N., Long. 115° 08′ E.*), is by a straight channel nearly six miles in length, to about $1\frac{1}{4}$ miles north-westward of Tanjong Salirong. In this channel, which is separated from Brunei channel by Rambler banks, there is a least depth in the fairway of 31 feet (9^m4) to within $1\frac{1}{4}$ miles north-north-westward of Tanjong Salirong.

Chart 1846, plan of Limbang estuary.

Pulau Burbunot, about 4 cables south-eastward of Pulau Baru-Baru (page 122), has two summits connected by low land. The north-eastern summit, 220 feet (67^m1) high, is wooded, the south-western summit, 190 feet (57^m9) high, on which there are two conspicuous trees, is covered with low scrub. There is a fishing village on this island. Pulau Lelipan and Pulau Selamok, two small islets, are situated, respectively, $1\frac{1}{4}$ cables and 3 cables south-eastward of Pulau Burbunot.

Between Tanjong Salirong and the entrance to Sungei Tamburong, about 5 miles south-south-westward, the eastern shore of the estuary is

Digitized by Google

Chart 1846, plan of Limbang estuary.

composed of mangrove swamps intersected by numerous rivers which are difficult to identify from seaward.

Bukit Apoi, 1,335 feet (406m9) high, the southern peak of a high saddleback ridge, situated about 10½ miles south-south-eastward of Tanjong Salirong, is usually prominent against the mountains farther inland. There are no other hills between it and the coast.

The western side of the estuary between Pulau Burbunot and Sungei Tamburong is occupied by the mouths of Batang Limbang and Sungei Pandaruan.

A ridge of hills extends from Kindana hill (page 120) for the whole length of Pulau Berambang; the highest peak, Bukit Buang Peiai, 623 feet (189m9) high, lies near the south-western end of the ridge.

A ridge extends southward from Bukit Buang Sakar and Bukit Say (page 108) for about 2½ miles, terminating in Bukit Lisang, 740 feet (225m5) high, which had, in 1927, a conspicuous tree on its summit.

Bukit Peninjauhan, 640 feet (195m1) high, on the summit of which there was, in 1927, a conspicuous tree, and Bukit Terumi, low and cleared, lie, respectively, about 6½ miles south-eastward and the same distance east-south-eastward of Bukit Lisang.

Batang Limbang is over 100 miles long, and navigable by steamers of about 10 feet (3m0) draught as far as the village of Limbang, which lies about 8 miles above its entrance; launches can proceed about 43 miles farther up river to Ukong village at the foot of some rapids.

Between a position about 1¼ miles north-westward of Tanjong Salirong and the bar of Batang Limbang, about 4 miles south-south-westward, the narrow channel, which also forms the entrance channel to Sungei Tamburong and Sungei Pandaruan, has a least depth in the fairway of about 3 fathoms (5m5); it is steep-to on its western side, and shoals gradually on its eastern side.

The channel across the bar had, in 1927, a least depth of 6 feet (1m8) near its outer end; this channel is marked by beacons consisting of a bamboo tripod surmounted by a board, painted white on the side towards the channel and red towards the shoals.

Above the bar there are depths in the river of about one to 14 fathoms (1m8 to 25m6) as far as Limbang, where the channel is obstructed by some sunken rocks, over which there are strong eddies; above these rocks there are depths in the channel of from 2 to 4 fathoms (3m7 to 7m3). At a sharp bend of the river, just below Limbang, there are very strong eddies. *Charts 2134, 1846, plan of Limbang estuary.*

Directions.—From Sapo point a vessel should steer south-westward through the approach channel, the limits of which are usually marked by large fish traps, to a position about 1¼ miles north-westward of Tanjong Salirong (*Lat. 4° 54′ N., Long. 115° 06′ E.*); no vessel without local knowledge should proceed farther. The river brings down quantities of timber, and a good look-out must be kept for stranded trees; boats should not be away at night.

Limbang.—At Limbang village, situated close north-westward of Bukit Peninjauhan, there is a wharf, 150 feet (45m7) in length, with a depth of 17 feet (5m2) alongside, and a boat pier, with a depth of 6 feet (1m8). Fresh provisions can be obtained. The village is the headquarters of a Resident Officer.

There is regular communication by launch with Brunei and Labuan and occasional steamer communication with Kuching.

Charts 1844, 2109, 2660b, 1263.

Digitized by Google

CHAPTER VI

NORTH-WEST COAST OF BORNEO—TANJONG TULAK TO TANJONG SAMPANMANGIO AND KUDAT HARBOUR

Charts 1844, 2109, 2111.

COAST.—Aspect.—From Pine point (*Lat. 5° 31′ N., Long. 115° 31′ E.*), situated 10 miles north-eastward of Tanjong Tulak (page 112), a range of hills extends about 6 miles south-westward, parallel with the coast and close within it, terminating in a prominent peak, 530 feet (161^{m}5) high. About 8 miles north-eastward of Pine point is Tanjong Nosong, the densely wooded northern extremity of a peninsula which forms the western side of Kimanis bay (page 129).

Mount Nosong, 360 feet (109^{m}7) high, lies about 1½ miles southward of Tanjong Nosong; from it a densely wooded ridge, the highest part of which has an elevation of 240 feet (73^{m}1), extends about 5 miles south-south-westward.

Climate and weather.—*See* page 22.

Dangers.—Between Tanjong Tulak and Tanjong Nosong the coastal bank, with depths of less than 5 fathoms (9^{m}1) over it, extends from about three-quarters of a mile to about 1¾ miles offshore. Rocks and shoals above and below water extend about 1½ miles northward from Tanjong Nosong; Tangut rock, 28 feet (8^{m}5) high, and Cake rock, 24 feet (7^{m}3) high, lie, respectively, about half a mile and a quarter of a mile northward of the point. A 2½-fathom (4^{m}6) patch lies about 2 miles north-north-eastward of the same point.

Chart 1844.

Iris shoals, with a least depth of 1½ fathoms (2^{m}7) over them, consist of several shoal patches, situated from about 1¼ to 6 miles northward of Tanjong Tulak.

Pine Point shoals, with depths of less than 3 fathoms (5^{m}5) over them, extend about 4½ miles north-westward from a position about 3 miles south-westward of Pine point; the shoalest spot, a rock, with a depth of one foot (0^{m}3) over it, lies about 4½ miles west-north-westward of Pine point.

Chart 2111.

Nosong patch, with a depth of 3½ fathoms (6^{m}4) over it, lies about 2½ miles north-westward of Tanjong Nosong; there are several patches, with depths of from 3 to 3½ fathoms (5^{m}5 to 6^{m}4) over them, between Nosong patch and the coastal bank south-eastward.

Chart 2109.

Outlying dangers.—Beacon.—Haselfoot patch, consisting of

Digitized by Google

Chart 2109.

two coral shoals, with least depths of 4 fathoms (7m3) over them, about half a mile apart, lies about 19 miles west-north-westward of Bethune head (page 109).

Charts 2111, 2109.

Samarang bank, consisting of dead coral and sandy patches, has general depths of less than 5 fathoms (9m1) over it, and a least depth of 3½ fathoms (6m4), situated about 25 miles west-north-westward of Bethune head (*Lat. 5° 24′ N., Long. 115° 15′ E.*).

Chart 2111.

Vernon bank, on which there are depths of less than 5 fathoms (9m1), lies about 24 miles north-westward of Bethune head; Fury rocks, consisting of several coral rocks, some of which are awash, lie on the southern part of this bank. In fine weather there is seldom much break of the sea over these rocks, and at high water often none. Vernon bank has not been completely examined and less water than charted may exist.

Chart 1844.

Mackenzie-Grieve shoals, with a least depth of 4¼ fathoms (7m8) over them, lie about 11½ miles north-north-westward of Bethune head; two shoals, with depths of 7 fathoms (12m8) over them, lie between Mackenzie-Grieve shoals and Gordon patches.

Gordon patches consist of several shoals, with depths of less than 5 fathoms (9m1) over them; the shoalest spot, with a depth of 3¾ fathoms (6m9) over it, lies about 14½ miles north-westward of Tanjong Tulak; about three-quarters of a mile eastward of the shoalest spot there is a small area, with a depth of 64 fathoms (117m0), mud bottom impregnated with sulphuretted hydrogen, over which are numerous gas bubbles.

Jahat shoals, consisting of numerous rocky patches, with depths of less than 3 fathoms (5m5) over them, lie about 8 miles west-north-westward of Pine point. Jahat rock, which dries 2 feet (0m6), lies near the middle of these shoals; a beacon, surmounted by a black cone, stands on the southern end of a 2-fathom (3m7) patch, situated about 1¼ miles east-south-eastward of Jahat rock; the beacon was reported, in 1949, to be difficult to distinguish; a rock, with a depth of less than 6 feet (1m8) over it, lies about 6 cables south-westward of Jahat rock. Between Jahat shoals and Iris shoals, there are several detached patches, with depths of from 5¼ to 9 fathoms (9m6 to 16m5) over them; the positions of these can best be seen on the chart.

Middle patches, with a least depth of 4½ fathoms (8m2) over them, lie about 3¾ miles north-westward of Jahat rock.

Chart 2111.

Winchester shoals consist of two patches close together, with a least depth of 1¾ fathoms (3m2) on the northern patch, situated about 15 miles west-north-westward of Tanjong Nosong; there are several patches, with depths of from 6½ to 8 fathoms (11m9 to 14m6) over them, close westward of Winchester shoals.

A shoal, with a depth of 3¾ fathoms (6m9) over it, lies about 6 miles northward of Winchester shoals.

Growler bank, with a least depth of 4½ fathoms (8m2) over it, lies about 8¼ miles west-north-westward of Tanjong Nosong; a 7-fathom (12m8) patch lies about 2¾ miles west-south-westward of this bank.

Nosong shoals, near the centre of which there are two islets com-

Digitized by Google

Chart 2111.

posed of broken white coral, are situated about 7¼ miles north-westward of Tanjong Nosong; the south-eastern and higher of these islets is 5 feet (1m5) high. A patch, which dries, lies 3 cables northward of the 5-foot (1m5) islet. Two patches, with depths of 5¾ and 8 fathoms (10m5 and 14m6) over them, lie about 3¼ miles east-north-eastward of the same islet.

Charts 1844, 2111.

Current.—Tidal streams.—H.M.S. *Merlin* reported that while that ship was at anchor for 19 hours on Gordon patches, in June, 1908, the maximum current experienced was west-north-westerly at a rate of half a knot.

In the vicinity of Vernon bank the currents are uncertain; in July, 1914, the current set almost continuously north-eastward with a rate of half a knot.

Near the coast the tidal streams are almost imperceptible. From July to the middle of October, 1905, farther from the coast but southward of Gordon patches and Winchester shoals, the current set nearly constantly northward or north-eastward at a rate of from a quarter to half a knot; the maximum observed was about 1¼ knots.

Near Four Fathom patches, in December, 1905, the current was found setting south-westward with a maximum rate of about half a knot; northward of Pulau Lubidan (page 112) it sets west-south-westward with a rate of about half a knot.

Caution.—The sea off this coast is generally much discoloured, and the shoals, even with a good light, are difficult to distinguish.

Chart 2111.

Pulau Tega.—Off-lying dangers.—Pulau Tega, 330 feet (100m6) high, lies about 5¾ miles north-eastward of Tanjong Nosong (*Lat. 5° 38′ N., Long. 115° 36′ E.*), from which it is separated by Tega channel, through which passes most of the traffic up and down this coast. This island is covered with jungle except the south-eastern peak and a sand spit which extends from its south-eastern end; on both of these there are large casuarina trees. Reefs and shoals, some of which dry, fringe the island and extend about half a mile southward and south-eastward from it (*see* views facing this page).

Dunlop shoal, with a depth of 3 fathoms (5m5) over it, lies about 2 miles southward of the western extremity of Pulau Tega; a 5-fathom (9m1) patch lies between them.

A shoal, with a least depth of 2¾ fathoms (5m0) over it, lies about 1½ miles westward of Pulau Tega.

Tega shoals, of coral, with depths of less than 5 fathoms (9m1) over them, and on which there are several rocks which dry, extend about 4 miles north-north-eastward from Pulau Tega. Turtle island, low, but 157 feet (47m8) high to the tops of the trees, lies on the eastern part of Tega shoals, about 1½ miles north-eastward of Pulau Tega. Pulau Burong, a rocky islet, 112 feet (34m1) high to the tops of the trees, lies about half a mile north-north-eastward of Turtle island; two rocks, which dry 5 feet (1m5) and 3 feet (0m9), lie about three-quarters of a mile, and 1¼ miles, respectively, north-north-eastward of this islet. Two shoals, with depths of 5½ and 5 fathoms (10m1 and 9m1) over them, lie about 2¾ and 3¼ miles, respectively, north-north-eastward of Pulau Burong.

Deluar shoals, with depths of less than 3 fathoms (5m5) over them,

Digitized by Google

To face page 128.

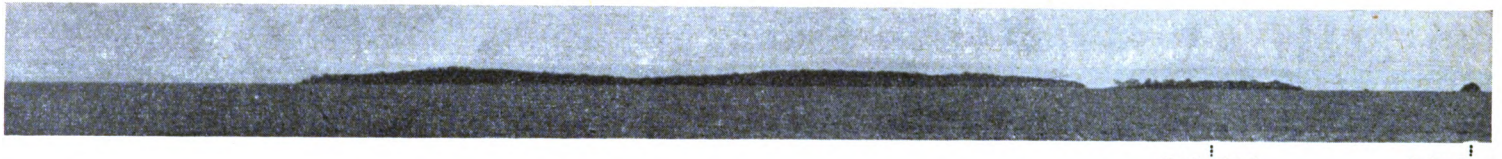
Pulau Tega.

Tanjong Nosong, bearing 073°, 10 miles.

Mt. Nosong.

Southern approach to Tega channel.

(*Original dated* 1918.)



Turtle island.

Pulau Burong, bearing 270°, 3½ miles.

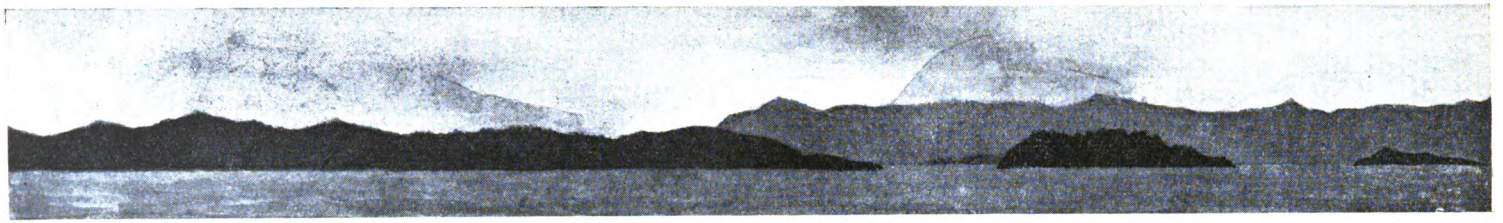
Pulau Tega from north-eastward.

(*Original dated* 1918.)

Digitized by Google

To face page 129.

Kina Balu.



Pulau Gaya.

Pulau Manukan,
N.W. point, bearing 079°, 5 *miles.*

West-south-western approach to Jesselton harbour.

(*Original dated prior to* 1934.)

Pulau Gaya.

Pulau Sinjataan,
bearing 120°, 3 *miles.*

Pulau Gaya from westward.

(*Original dated* 1918.)

Digitized by Google

Chart 2111.

on which the sea breaks, lie about 6½ miles north-north-eastward of Pulau Tega; several rocks, above water, one of which is 2 feet (0m6) high, lie on these shoals about 1½ miles from their north-eastern end.

A shoal ridge was reported, in 1916, with its south-eastern end, which has a depth of 6½ fathoms (11m9) over it, about 7½ miles westward of the 2-foot (0m6) rock on Deluar shoals; this ridge is marked by discoloration. A 4¼-fathom (7m8) patch lies about 6 cables north-westward of the 6½-fathom (11m9) patch. Several patches, with depths of 5 fathoms (9m1) over them, lie about 1¼ miles north-eastward of this ridge. A 5-fathom (9m1) shoal, composed of rock and sand, and a 5¼-fathom (9m6) patch lie about 2¾ miles northward and north-north-westward, respectively, of its northern end.

Kimanis bay.—Aspect.—Kimanis bay is entered between Tanjong Nosong and Tanjong Papar, about 20 miles east-north-eastward. Between Kuala Penyu, about 3½ miles southward of Tanjong Nosong, and Tanjong Dukan, about 2¼ miles south-south-westward of Tanjong Papar, the shore of Kimanis bay is low and swampy with a sandy beach and, in places, a narrow band of casuarina trees. For some distance inland the country is flat and swampy, or covered with dense jungle; the latter is especially prevalent near the south-eastern part of the bay.

The densely wooded Suniatan range of mountains lies from about 13 to 17½ miles from the eastern side of the bay; these mountains rise to an elevation of 5,013 feet (1,528m0), and slope on their western side to the low coastal plain.

From the Suniatan range a serrated ridge runs north-westward, terminating at Tinamandukan (*Lat. 5° 38′ N., Long. 116° 02′ E.*), 2,460 feet (749m8) high, and prominent from all directions, situated about 10¾ miles south-eastward of Tanjong Papar.

Kilatuan, 1,536 feet (468m2) high, with a round summit, and Bukit Tebelong, 2,033 feet (619m7) high, with a bare summit and conspicuous, lie, respectively, 6½ miles south-south-eastward and 9 miles eastward of Tanjong Papar.

Several detached hills, from 200 to 800 feet (61m0 to 243m8) high, rise from the plain between the Suniatan range and the coast, but these are not prominent.

Kinandukan peak, close southward of Tanjong Dukan, is 475 feet (144m8) high, and is covered with dark trees which are prominent against the distant hills, which latter are often partially obscured by mist or rain.

At the entrance to Kuala Penyu there is a bar, with a depth of 4 feet (1m2) over it, which is free from rollers, and a shore bank, with depths of less than 3 fathoms (5m5) over it, extends about 2¾ miles seaward from its mouth. The settlement of Sitompok is situated about 2 miles up the river; a few small cattle are obtainable here.

Kuala Lama, Sungei Membákut and Sungei Bangawan are small unimportant rivulets discharging into the head of Kimanis bay, about 4, 11½ and 13½ miles, respectively, eastward of Kuala Penyu. The village of Bangawan stands about 2 miles up the river of the same name; it is connected to the railway system.

Sungei Kimanis, Sungei Benoni, Sungei Menani, and Sungei Papar all discharge into the eastern side of Kimanis bay; these rivers have bars, but, in favourable circumstances, they can be entered by small boats at high water.

Charts 2660b, 1263.

Digitized by Google

Chart 2111.

There is a settlement at Kimanis, about 2 miles up Sungei Kimanis, and a populous town at Papar, which stands about 2 miles south-eastward of Tanjong Papar ; both are connected to the railway system. A few cattle are obtainable at Papar.

Anchorages.—There is good holding ground anywhere in Kimanis bay, but the best anchorage is near its eastern side, where the depths are greater close inshore and where the bottom is stiffer and less sandy. During the North-east monsoon vessels can anchor, in a depth of about 8 fathoms (14^{m}6), about 1½ miles south-eastward of the southern extremity of the western end of Pulau Tega ; during the South-west monsoon they can anchor, in a depth of 10 or 11 fathoms (18^{m}3 or 20^{m}1), northward of the sandspit at the south-eastern extremity of that island, or, in depths of from 12 to 14 fathoms (21^{m}9 to 25^{m}6), half a mile eastward of Turtle island. Both monsoons cause a swell in Kimanis bay.

Current.—Tidal streams.—The tidal streams off the south-eastern end of Pulau Tega (*Lat. 5° 42′ N., Long. 115° 40′ E.*) are irregular, and apparently influenced by the currents set up in the offing by temporary or prevailing winds. In December, 1904, they often set between east-north-east and south-east, the former with a falling tide, with a maximum rate exceeding three-quarters of a knot ; occasionally with a rising tide the stream set south-westward.

In Kimanis bay, no current was experienced ; in November, 1905, off the mouth of Sungei Papar, a north-westerly set with a rate of half a knot was observed.

Coast.—Islands and dangers.—Between Tanjong Papar and Tanjong Pangallat, about 4¼ miles east-north-eastward, the coast is low and sandy. Tanjong Pangallat is a thickly wooded bluff, 289 feet (88^{m}1) high to the tops of the trees.

Pulau Laiang, about 1½ miles north-westward of Tanjong Papar, is a rocky islet, 103 feet (31^{m}4) high, and densely covered with bushes ; the islet lies in the middle of a shoal, with depths of less than 3 fathoms (5^{m}5) over it, which extends about a quarter of a mile eastward and westward from it.

Between Tanjong Pangallat and Sungei Kinarut, an unimportant rivulet accessible only to canoes, about 3¼ miles north-eastward, rocky ledges, which dry, extend about half a mile offshore, and the coastal bank, with depths of less than 3 fathoms (5^{m}5) over it, extends about one mile offshore from the whole coast between Tanjong Papar and the river.

Between Sungei Kinarut and Tanjong Dumpil, 181 feet (55^{m}2) high, on which stand some trees, situated about 4½ miles north-north-eastward, the coast forms a bay, which is obstructed by reefs and shoals which dry. Sungei Dumpil discharges into the northern part of this bay about one mile southward of Tanjong Dumpil.

Chart 2111, plan of Dinawan anchorage.

Dinawan anchorage.—Dangers.—Pulau Dinawan, which appears as three islets from seaward, is a well wooded island, 240 feet (73^{m}1) high ; Flagstaff point, its eastern extremity, is situated about 1¾ miles north-westward of the entrance to Sungei Kinarut. There is good landing at Flagstaff point.

From the southern side of Pulau Dinawan a reef, which dries in places, and on which there is an islet, 3 feet (0^{m}9) high, extends about

Digitized by Google

Chart 2111, plan of Dinawan anchorage.

3½ cables south-south-eastward. A coral reef lies on the south-eastern edge of a bank, over which there is a depth of 3 feet (0m9), about half a mile south-eastward of the southern extremity of Pulau Dinawan, and a 1¾-fathom (3m2) patch lies about one cable farther south-eastward. A reef, which dries in places, fringes the eastern side of the island, and from its northern and western sides a bank, with depths of less than 3 fathoms (5m5) over it, extends about one cable offshore.

Everett reef, which dries in places, and on which there is a rock 3 feet (0m9) high, lies about 1¾ cables eastward of Flagstaff point (*Lat. 5° 51′ N., Long. 116° 00′ E.*); small craft can anchor between them, in a depth of about 7 fathoms (12m8). The entrance to this anchorage, southward of Everett reef, is named Flint pass.

Several coral reefs lie between the southern end of Everett reef and the coral reef lying half a mile south-eastward of Pulau Dinawan and other reefs lie within half a mile eastward of the line joining those dangers.

Chart 2111.

Coast.—Islets.—Dangers.—Pulau Sugara, densely wooded with trees, 357 feet (108m8) high, lies near the outer edge of a flat which extends about half a mile northward from the entrance to Sungei Kinarut; from this islet rocky ledges, which dry, extend about half a mile north-westward.

An islet, 86 feet (26m2) high, lies about 4 cables west-south-westward of Pulau Sugara; Pulau Panduan, 20 feet (6m1) high, which is infested with snakes, lies on the flat about half a mile offshore and 1¾ miles north-eastward of Pulau Sugara.

Tinson reefs, composed of coral, and steep-to, on which there are some rocks above water, lie about 1¾ miles south-south-westward of Tanjong Dumpil.

Chart 3626.

Dumpil rock, which dries one foot, lies on a reef, with depths of less than 6 feet (1m8) over it, with its outer edge about one mile westward of Tanjong Dumpil.

Tanjong Aru, about 3¼ miles northward of Tanjong Dumpil, is low and flat; a bank, on which are some rocks which dry, extends about one mile westward; about three-quarters of a cable farther westward is a shoal, with a least depth of 6 feet (1m8) over it.

Pulau Sulug, 339 feet (103m3) high, lies about 2¾ miles westward of Tanjong Aru; banks, with depths of less than 3 fathoms (5m5) over them, extend about 2¼ cables northward, and 1½ cables southward from this island.

Pulau Manukan, 352 feet (107m3) high, lies with its south-western extremity about half a mile northward of Pulau Sulug; reefs extend about 1¾ cables from the eastern end of the island, and also about one cable from its southern side. A detached reef, with a rock, above water, near its southern end, lies about 3¼ cables eastward of Pulau Manukan, from which it is separated by a channel half a cable wide, with a depth of 12 fathoms (21m9) in the fairway. In northerly winds vessels can anchor off the southern side of Pulau Manukan, in a depth of 14 fathoms (25m6), mud. *See* view facing page 129.

Pulau Mamutik, 208 feet (63m4) high, lies about half a mile south-eastward of Pulau Manukan; reefs, some of which are above water,

Digitized by Google

Chart 3626.

extend more than 3 cables southward and three-quarters of a cable northward from this island.

A reef, with a depth of one fathom (1m8) over it, lies about 3½ cables south-eastward, and another, nearly awash, about half a mile east-north-eastward of Pulau Mamutik; a shoal, with a least depth of 3½ fathoms (6m4) over it, lies about 6 cables eastward of that island.

Prohibited anchorage.—Vessels are cautioned not to anchor in the area indicated by pecked lines on chart 3626 westward of Tanjong Aru, on account of the existence of telegraph cables.

Chart 2111.

Outlying danger.—South Hill rock, with a least depth of 2¾ fathoms (5m0) over it, and with from 23 to 25 fathoms (42m1 to 45m7) close-to, lies about 10½ miles westward of Tanjong Aru.

Chart 3626.

Pulau Gaya.—Southern and western sides.—Dangers.—Beacons.—Pulau Gaya, 950 feet (289m6) high, and densely wooded except for its summit which is bare, lies with its southern extremity about 2¼ miles northward of Tanjong Aru; it is almost connected to the mainland south-eastward by reefs, parts of which dry. South channel, a narrow unmarked channel with, in 1925, a depth of 6 feet (1m8), leads through these reefs into Jesselton harbour (*see* below); it is only available to boats with local knowledge (*see* views facing page 129).

A shoal, with a least depth of 7 feet (2m1) over it, marked on its southern side by a red beacon and a white beacon, lies on the northern side of the approach to South channel, about 8 cables south-eastward of the southern extremity of Pulau Gaya; a 3½-fathom (6m4) patch lies about 1½ cables southward of the red beacon.

Snake rock, 3 feet (0m9) high, lies on the reef about half a mile southward of Tanjong Sindian, the eastern extremity of Pulau Gaya.

Karei bay, much obstructed by reefs, lies near the south-eastern end of Pulau Gaya, between Tanjong Sindian (*Lat. 6° 00′ N., Long. 116° 04′ E.*) and the southern extremity of the island.

Pulau Sinjataan or Loney island, a thickly wooded island, 355 feet (108m2) high, lies close off the south-western point of Pulau Gaya, to which it is connected by a flat which almost dries; a bank, with depths of less than 5 fathoms (9m1) over it, extends from 2 to 3 cables southward and south-westward from Pulau Sinjataan, and two shoals, with depths of 4 and 5½ fathoms over them, lie about 2 cables north-westward and 2½ cables westward, respectively, of the north-western extremity. *See* view facing page 129.

Edgell patches, two patches, each with a least depth of 7 fathoms (12m8) over it, lie about three-quarters of a mile and one mile westward of Pulau Sinjataan.

Between the south-western point of Pulau Gaya and Tanjong Bulijong, the northern extremity, about 2 miles northward, a bank, with depths of less than 5 fathoms (9m1) over it, extends from half a cable to 1½ cables offshore. A rock, with a depth of less than 6 feet (1m8) over it, lies about three-quarters of a cable north-eastward of Tanjong Bulijong.

JESSELTON HARBOUR AND APPROACH.—Islands.—Dangers.—The approach to Jesselton harbour lies between Tanjong

Charts 2660b, 1263.

Digitized by Google

Chart 3626.

Bulijong and Gaya head, about 5¾ miles north-eastward (*see* view facing page 134).

Between Tanjong Bulijong and Tanjong Torajun, about 2¼ miles east-south-eastward, the northern coast of Pulau Gaya is indented by two bays, which are separated by Tanjong Merangis. A bank, with a depth of less than 3 fathoms (5m5) over it, extends about 2 cables north-eastward from Tanjong Torajun.

Gaya head is a densely wooded bluff from which the land rises rapidly to Bukit Penaga, 1,112 feet (339m0) high, situated about 7 cables east-south-eastward. A shoal, with a depth of 6 fathoms (11m0) over it, lies about 3 cables offshore and 7 cables southward of Gaya head; a 6½-fathom (11m9) patch lies about 1¾ cables farther southward.

Tanjong Melanim lies about 2 miles south-eastward of Gaya head. A chain of islands extends about 2¾ miles south-westward from the coast about three-quarters of a mile north-north-westward of Tanjong Melanim. Pulau Sapangar, at the outer end of the chain, is 670 feet (204m2) high, and densely wooded; it is fringed with reefs except near the western side of its southern end. Spits, with depths of less than 5 fathoms (9m1) over them, extend about 2 cables south-westward from the southern, and 3 cables northward from the northern extremities of this island, and from its eastern extremity a reef, which dries, extends about a quarter of a mile southward.

Pulau Udar (*Lat. 6° 05′ N., Long. 116° 05′ E.*), 201 feet (61m3) high, lies about 4 cables eastward of the northern extremity of Pulau Sapangar, from which it is separated by a narrow channel, with depths of from 7 to 12 fathoms (12m8 to 21m9).

Udar kechil and Udar Priok, 166 and 97 feet (60m0 and 29m6) high, respectively, lie between Pulau Udar and the coast, about three-quarters of a mile northward of Tanjong Melanim; these islets are connected to each other, and to the coast north-eastward, by a reef, which also extends about half a cable south-westward from the former islet. These islets, together with Pulau Sapangar and Pulau Udar, form the western side of Sapangar bay.

Sapangar bay is entered between the southern extremity of Pulau Sapangar and Tanjong Tarak Tarak, about 2½ miles east-south-eastward; it is one of the most secure harbours on the north-west coast of Borneo, and is available to all classes of vessels.

Between Tanjong Tarak Tarak and Sungei Menggatal or Kabatuan, which discharges about one mile north-eastward, coral reefs, which dry in places, and on which there is a rock 3 feet (0m9) high, extend from about one to 3½ cables offshore. A conspicuous yellow patch lies on the hillside about 2½ cables south-south-westward of the southern entrance point of Sungei Menggatal. The entrance to this river may be identified by a yellow sandstone bluff on the northern side, and the abrupt angle of the coast on the southern side of the entrance. The bar, composed of coral knolls, has a depth of about 2 feet (0m6), but there are greater depths within.

The shores of Sapangar bay between Tanjong Melanim and the entrance to Sungei Menggatal are fringed by coral reefs, above water in places, which, from a position about three-quarters of a mile northward of the entrance to Sungei Menggatal, extends about 7 cables westward. The village of Gantisan is situated near the north-eastern side of the head of the bay.

Charts 2111, 287, 2660b, 1263.

Digitized by Google

Chart 3626.

The usual anchorage in Sapangar bay is, in depths of from 9 to 12 fathoms (16m5 to 21m9), off the mouth of Sungei Menggatal, or nearer to the head of the bay ; vessels can anchor anywhere in the bay according to the prevailing wind.

Gaya bay.—Dangers.—Beacon.—Gaya bay is the name given to the area south-westward of Sapangar bay, and is entered from seaward between the southern extremity of Pulau Sapangar and Tanjong Torajun.

Malohom bay lies on the southern side of the entrance between Tanjong Torajun (*Lat. 6° 02′ N., Long. 116° 03′ E.*) and Tanjong Logong, about one mile south-eastward ; coral reefs fringe the shores of the bay, especially near its south-eastern end.

Between Tanjong Tarak Tarak and Tanjong Lita, about 1½ miles southward, a bank, which dries in places, extends, with depths of less than 6 feet (1m8) over it, from about one to 4 cables offshore.

A flat, almost awash in parts, on the outer part of which there is a reef, extends about 7 cables westward from Tanjong Lita ; a rock, 4 feet (1m2) high, lies on the northern part of the reef, about half a mile westward of Tanjong Lita, and a rock, 5 feet (1m5) high, lies on its southern part about 2¾ cables southward of the 4-foot (1m2) rock.

A shoal, with a least depth of 1½ fathoms (2m7) over it, lies about one mile south-westward of Tanjong Lita ; Creighton patch, with a depth of 5 fathoms (9m1) over it, lies about 1½ miles west-south-westward of the same point.

Between Tanjong Lita and Tanjong Lipat, 2 miles south-westward, the coast forms a bay, the inner part of which dries. Sungei Inanam, which is only available to boats, discharges about one mile south-south-eastward of Tanjong Lita.

A reef, with a least depth of 3 feet (0m9) over it, lies about 4½ cables north-eastward of Tanjong Lipat.

A white triangular beacon stands on the 276-foot (84m1) summit about 1¾ cables south-westward of Tanjong Lipat.

Anchorage.—Directions.—Vessels can anchor anywhere in Gaya bay.

Vessels proceeding to Gaya or Sapangar bays should pass about half a mile southward of Pulau Sapangar, and thence to the anchorage selected ; small craft with local knowledge can use the channel between Pulau Sapangar and Pulau Udar.

Current.—During the survey between Pulau Tega and Sungei Tuaran (page 137), from June to December 1908, the current set north-eastward, with a maximum rate of 1½ knots after strong south-westerly winds.

Chart 3525.

Jesselton harbour. — Lights. — Dangers. — Beacons. — Jesselton harbour, the principal port on the north-west coast of British North Borneo, is entered between Tanjong Logong and Tanjong Lipat ; it is protected from westward by Pulau Gaya and the reefs between that island and the mainland ; it is somewhat exposed northward, but is partly protected by the reefs in the entrance. *See* view facing this page.

From a point about 3½ cables southward of Tanjong Logong a reef, which dries in places, extends about 6 cables eastward and 5¼ cables south-eastward ; a beacon, surmounted by a cylinder, painted in red and yellow chequers, marks the eastern extremity of this reef.

Charts 2111, 287, 2660b, 1263.

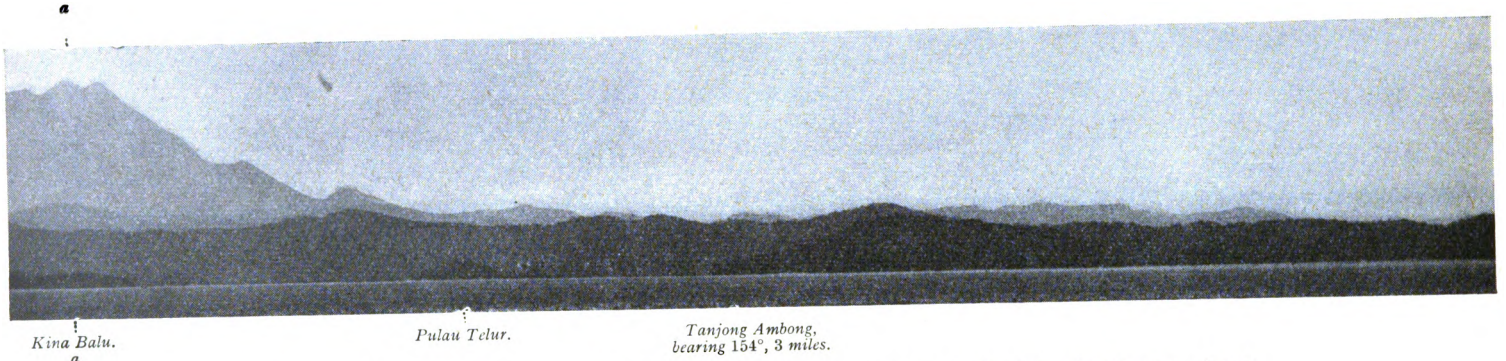
Digitized by Google

To face page 134.

North-western approach to Gaya bay.
(*Original dated* 1918.)

Jesselton harbour from northward.
(*Original dated* 1918.)

Digitized by Google



View, in two parts, of north-western approach to Ambong bay.

(*Original dated* 1918.)

Digitized by Google

Chart 3525.

Pulau Plompong, 46 feet (14m0) high, lies on the northern part of this reef about 4½ cables south-eastward of Tanjong Logong.

Gaya harbour lies between the reef described above, and a reef which extends about 2½ cables east-north-eastward from Tanjong Sindian, the eastern extremity of Pulau Gaya. From the head of the harbour, reefs, almost awash, and steep-to, with a patch, which dries, near their eastern edge, extend about 3 cables offshore.

Between Tanjong Lipat and the pier, which lies about three-quarters of a mile south-westward, the coastal bank, with depths of less than 6 feet (1m8) over it, extends from about one to 1½ cables offshore. A red beacon, surmounted by a diamond, with red and yellow bands, marks the edge of the coastal bank about one cable north-eastward of the head of the pier.

Normanhurst reef, with a least depth of 4 feet (1m2) over it, and Comber reef, with a least depth of 2 feet (0m6) over it, lie about 3½ and 1½ cables, respectively, north-westward of Tanjong Lipat. Gueritz shoal, with a least depth of 9 feet (2m7) over it, and marked by a beacon, surmounted by a red and yellow rectangle, lies about 5½ cables west-north-westward of Tanjong Lipat. Grieve reef, with a least depth of 6 feet (1m8) over it, lies about 5¾ cables east-north-eastward of Tanjong Sindian.

A light is exhibited, at an elevation of 25 feet (7m6), from a white iron column on a concrete base, 24 feet (7m3) in height, on Grieve reef (*Lat. 6° 00′ N., Long. 116° 04′ E.*).

Reefs extend about 3 cables east-south-eastward from Tanjong Sindian; a detached reef, with a least depth of one foot (0m3) over it, marked by a black beacon, surmounted by a cone, near its north-eastern end, lies about half a cable farther from the point in the same direction.

Harris reef, with a least depth of one foot (0m3) over it, marked by a black and white chequered beacon, surmounted by a cone, on its eastern side, lies about half a mile east-south-eastward of Tanjong Sindian.

Hewlett reef, with a least depth of one foot (0m3) over it, marked by a beacon, surmounted by a black and white chequered cylinder, lies about half a mile west-south-westward of Tanjong Lipat.

The north-eastern edge of the shoals in South channel west-north-westward of the pier-head is marked by four black and white beacons, three of which are in ruins, but were visible in 1945; the positions of these beacons can best be seen on the chart.

Two shoals, with depths of 18 and 21 feet (5m5 and 6m4) over them, lie about three-quarters of a cable and 1½ cables, respectively, north-westward of the beacon situated about 1½ cables westward of the light-structure on the elbow of the pier.

A light is exhibited, at an elevation of 23 feet (7m0), from an iron column on the elbow of the pier. In 1946 this light was extinguished.

Charts 3525, 3626.

Anchorage.—Directions.—There is fairly secure anchorage, in a depth of 8 fathoms (14m6), about 4½ cables north-north-westward of the pier light-structure, and also in Gaya harbour.

Vessels should not anchor between Grieve reef light-structure and the pier on Wednesdays and Thursdays, on which days the fairway to the pier is required to be kept clear for local vessels.

Charts 2660b, 1263.

Digitized by Google

Charts 3525, 3626.

A vessel approaching Jesselton harbour should give a berth of about three-quarters of a mile to the northern coast of Pulau Gaya, and pass the beacon, marking the extremity of the reef extending south-eastward from Pulau Plompong, at a safe distance ; thence she should pass between the light-structure on Grieve reef and the beacon on Gueritz shoal and thence between the beacons marking Harris reef and Hewlett reef, and thence to the anchorage.

The clock-tower in line with the western end of the arm of the pier, bearing 181°, leads through the channel.

Vessels in quarantine should anchor within the area enclosed by the following limits :—

A line drawn in a 000° direction for 11½ cables from Tanjong Lipat (*Lat. 6° 00′ N., Long. 116° 05′ E.*) ; thence in a 270° direction for 9 cables ; thence in a 180° direction, through the beacon marking the eastern edge of the reef on which Pulau Plompong lies, for 11½ cables ; and thence in a 090° direction to Tanjong Lipat.

Chart 3525.

Jesselton.—The town of Jesselton, situated on the eastern shore of the harbour about one mile south-westward of Tanjong Lipat, had, in 1931, a population of 4,745 ; in 1936 there were about 30 Europeans. A conspicuous clock tower is situated on a small hill near the centre of the town. Jesselton is the place of residence of the Governor of British North Borneo.

There is a Government hospital with accommodation for 4 Europeans.

Jesselton is the transit port for most of the produce of the north-western side of British North Borneo.

Communications.—Radio station.—There is a post-office, and the town is connected to the British North Borneo railway and telegraph systems ; there is regular steamer communication with Singapore, Sandakan and ports in the State of British North Borneo.

There is occasional steamer communication with Hong Kong and the Philippine islands.

There is a radio station. *See* page 21.

Harbour facilities.—There is a pier, with depths at the arm of from 18 to 26 feet (5^{m}5 to 7^{m}9), which is connected to the railway system.

A small quantity of fresh provisions is obtainable ; boiler water is laid on to the pier.

Small repairs to vessels can be carried out.

Trade.—The chief exports are rubber and jungle produce ; imports are mainly manufactured goods.

Signals.—The following signals are made from a flagstaff on the pier, and refer to the tidal stream alongside the pier.

An inverted triangle	Flood stream.
A triangle	Ebb stream.
A globe	Slack water.

There is a flagstaff on the 280 foot (85^{m}3) summit about 2 cables southward of the root of the pier, from which signal communication with vessels is carried out.

Charts 2111, 287.

COAST.—Aspect.—Mount Kina Balu, 13,450 feet (4,099^{m}6) high, about 28 miles eastward of Gaya head, is very prominent and may be

Digitized by Google

Charts 2111, 287.

seen in clear weather at a great distance. The summit of this mountain, usually obscured by clouds for the greater part of the day, consists of a number of serrated peaks of nearly equal elevation ; northward of these it slopes gradually for 4 miles and then falls away abruptly. *See* view facing page 135.

Mount Tambuyukon, a prominent rounded peak, 8,445 feet (2,574^{m}0) high, lies in the same range as Mount Kina Balu, about 10 miles north-north-eastward. Gunong Sadok Sadok, 5,500 feet (1,676^{m}4) high, lies about 4½ miles westward of Mount Kina Balu ; when seen from northward this peak appears as a sharp cone.

Chart 2111.

Sungei Mengkábong, only accessible by small craft in very fine weather, is entered about 2 miles east-north-eastward of Tanjong Kaetan (*Lat. 6° 07′ N., Long. 116° 06′ E.*), the northern extremity of Gaya head ; a bank, with depths of less than 3 fathoms (5^{m}5) over it, extends about three-quarters of a mile seaward from the mouth of this river. There is a depth of 1½ feet (0^{m}5) over the bar close outside the entrance, but there are greater depths inside, where the river opens out into an area of marshes and a lagoon.

Mengkábong bluff, about 369 feet (112^{m}5) high to the tree-tops, lies about 3¾ miles north-eastward of Tanjong Kaetan ; reefs extend a short distance from the bluff, and a sandy beach connects it with the mouth of Sungei Mengkábong. Thence to Tanjong Indeh, about 5¾ miles north-eastward, the coast is low, sandy, and covered with casuarina trees ; from it a coastal bank, with depths of less than 3 fathoms (5^{m}5) over it, extends about a quarter of a mile offshore. A small stream connected to Sungei Mengkábong discharges close northward of Mengkábong bluff.

Sungei Tuaran, available for vessels with about 6-foot (1^{m}8) draught, in favourable weather, is entered about 3¼ miles north-eastward of Mengkábong bluff ; a flat extends about 3 cables from the entrance to this river. Within the bar there are depths of about 3 fathoms (5^{m}5), and the river is reported to be navigable by boats for a considerable distance. The Residency for the district is situated about 4 miles up river ; it is connected by telephone to Jesselton.

Sungei Sulaman is entered between Tanjong Indeh and the sand-banks, parts of which dry, and on which the sea generally breaks, which extend about 1¾ miles westward from Tanjong Gusu, about one mile north-eastward ; the entrance channel is about 1½ cables wide. An islet, 80 feet (24^{m}4) high, lies in the entrance about three-quarters of a mile eastward of Tanjong Indeh.

In 1909, vessels of 8-foot (2^{m}4) draught could enter the river, keeping Tanjong Indeh bearing 111° while crossing the bar, and thence rounding that point closely.

Inside the entrance a channel 3 miles long, with a depth of 3½ fathoms (6^{m}4), leads to a shallow lake, encumbered with flats, and surrounded by mangrove swamps, amongst which the river is lost.

The muddy water discharged from the rivers described above reaches a distance of about 5 miles offshore, where its limit is clearly marked.

Junction bluff lies about 3 miles north-eastward of Tanjong Gusu ; from the bluff the land rises rapidly to the prominent Mount Lokpussok, 1,430 feet (435^{m}9) high and densely wooded, about three-quarters of a mile south-eastward.

Charts 2660b, 1263.

Digitized by Google

Charts 1778, 2111, 2112.

Between Junction bluff and Tanjong Ambong, about 3½ miles north-eastward, there is a bight, with depths of less than 3 fathoms (5m5), divided into two parts by a small peninsula, 357 feet (108m8) high, extending about 4 cables north-westward from a position about one mile south-westward of Tanjong Ambong. A rock, 10 feet (3m0) high, lies in the bight about one mile east-north-eastward of Junction bluff and one cable offshore.

Chart 2111.

Anchorage.—Directions.—There is good anchorage, about half a mile offshore, anywhere between Gaya head and a position about one mile southward of Tanjong Indeh, except close off the mouths of the rivers.

Vessels proceeding coastwise should give a berth of at least 2 miles to Tanjong Indeh and the coast northward of it, on account of the shifting nature of the banks.

Current.—During the strength of the North-east monsoon, in 1847, a strong current was found setting north-eastward at a distance of 7 miles offshore.

Outlying island and dangers.—Beacon.—Pulau Mangalum (*Lat. 6° 12′ N., Long. 115° 36′ E.*), low and covered with trees, about 170 feet (51m8) high, lies about 26 miles west-north-westward of Tanjong Bulijong (page 132). The island is surrounded by coral reefs except near its south-eastern end, where vessels can anchor close offshore, keeping a good look-out for shoals.

The best landing places are eastward of Tanjong Yu, its southern extremity, or close southward of Tanjong Kring, its eastern extremity, if wind and sea permit.

A small creek enters the sea northward of Tanjong Kring and there is another eastward of Tanjong Sauh, the south-western extremity of the island.

A bank, with depths of less than 5 fathoms (9m1) over it, extends about 4 miles westward and about 2½ miles south-westward from Tanjong Sauh. Two rocks, with depths of less than 6 feet (1m8) over them, lie about one and 2 miles, respectively, westward of the point, and a 9-foot (2m7) patch lies nearly 1½ miles south-south-westward of it. Foul ground extends about 11 cables eastward and 9 cables north-eastward from Tanjong Timor Laut, the north-eastern extremity of the island. A bank, with depths of less than 5 fathoms (9m1) over it, extends about 2½ miles north-eastward from Tanjong Timor Laut. A bank, with a least depth of 19 feet (5m8) over it, lies from 2 to 3¼ miles northward of the island, and a bank, with a least depth of 26 feet (7m9) over it, lies from about 1¾ to 3½ miles west-north-westward of the island.

A bank, with a depth of 8 fathoms (14m6) over it, lies about 3 miles south-south-westward of Tanjong Yu.

Saracen bank, discovered by H.M.S. *Saracen*, in 1854, is an extensive coral bank, with general depths of from 3 to 5 fathoms (5m5 to 9m1) over it, on which are many rocks above and below water, lying about 11½ miles west-south-westward of Pulau Mangalum. An iron tripod beacon, painted red, surmounted by a square daymark, 20 feet (6m1) high, stands on the south-eastern part of Saracen bank.

The bank is much used by native fishermen, who erect wooden frames for drying fish in many parts of the foul ground.

Charts 287, 2660b, 1263.

Digitized by Google

Chart 2111.

Shoals were reported, in 1949, to lie about 5 miles south-eastward of the beacon, and several shoals, with depths of from 3½ to 7 fathoms (6m4 to 12m8) over them, lie within 10 miles east-south-eastward of it. This area has not been closely examined, and unknown dangers may exist; the area between Saracen bank and Pulau Tega (page 128) should therefore be avoided.

Rizal shoal, an extensive area with depths of less than 5 fathoms (9m1) over it, lies with its shoalest part about 10 miles west-north-westward of Pulau Mangalum; the least known depth over this shoal is 3¾ fathoms (6m9), near its steep-to western side.

Chart 2660b.

A bank, with a depth of 15 fathoms (27m4) over it, was reported, in 1949, to lie about 38 miles westward of Pulau Mangalum.

Charts 2111, 2112.

Sunken Barrier shoals are a chain of coral shoals, with depths of from 4 to 9 fathoms (7m3 to 16m5) over them, with deep water between them, lying between Pulau Mangalum (*Lat. 6° 12′ N., Long. 115° 36′ E.*) and Mantanani islands (page 145), about 50 miles north-eastward. These shoals, which are generally plainly visible, were found during the survey of H.M.S. *Merlin*, 1909–1910. Vessels should not attempt to cross these shoals; the passage between them and the mainland, about 16 miles south-eastward, is believed to be clear of outlying dangers.

The south-western Sunken Barrier shoal, with a least depth of 4¼ fathoms (7m8) over it, consists of an extensive coral bank, the shoalest part being situated about 24 miles north-westward of Gaya head.

Chart 2112.

Francis bank, with a least depth of 5½ fathoms (10m1) over it, lies about 25 miles westward of Ambong point.

Bunbury shoals, with a least depth of 4 fathoms (7m3) over them, lie about half a mile north-eastward of Francis bank.

St. Joseph rock, awash, lies near the south-western extremity of a coral shoal, with depths of from 2½ to 4¾ fathoms (4m6 to 8m7) over them, about 8 miles north-eastward of Bunbury shoals; the rock lies near the middle of an extensive bank, with depths of from 5 to 20 fathoms (9m1 to 36m6) over it.

Pritchard bank, with depths of from 12 to 20 fathoms (21m9 to 36m6) over it, lies about 7 miles north-westward of St. Joseph rock.

There are numerous detached patches, with depths of from 9 to 20 fathoms (16m5 to 36m6) over them, between Sunken Barrier shoals and the mainland; the positions of these can best be seen on the chart.

Chart 1778.

Ambong bay.—Dangers.—Ambong bay is entered between Tanjong Ambong and Tanjong Perunjuk, about 1¼ miles eastward. The head of the bay is divided into two coves by Pulau Telur, a thickly wooded island, 234 feet (71m3) high, and the reefs fringing it. The village of Ambong is situated on the northern side of the eastern cove, about half a mile eastward of Tanjong Teluk, situated three-quarters of a mile south-eastward of Tanjong Perunjuk. Close southward of the head of the bay a range of hills rises to an elevation of 1,252 feet (381m6) about 1¼ miles south-eastward. (*See* view facing page 135.)

Tanjong Ambong (*Lat. 6° 19′ N., Long. 116° 17′ E.*) is a moderately

Digitized by Google

Chart 1778.

bold headland, rising to an elevation of 548 feet (167m0) about half a mile from its extremity; a bank, with depths of less than 3 fathoms (5m5) over it, on which are some rocks, which dry 5 feet (1m5), extends about one cable northward, and 4 cables eastward from this head.

Belcher shoal, with a least depth of 3 feet (0m9) over it, coral, lies about 7 cables north-north-eastward of Tanjong Ambong; Rodney Mundy shoal, with a least depth of 1¼ fathoms (2m3) over it, lies about 4 cables northward of the same point.

From Tanjong Perunjuk, a bank, with depths of less than 3 fathoms (5m5) over it, extends about one cable southward and north-westward; a 3-fathom (5m5) patch lies about 1½ cables south-south-westward of this point.

The shores of Ambong bay are fringed by reefs, most of which dry, and which extend in places about 4 cables offshore.

Anchorage.—Directions.—Large vessels can anchor, in a depth of about 7 fathoms (12m8), mud, about half a mile south-westward of Tanjong Perunjuk, where there is partial shelter from the swell caused by either monsoon. Smaller vessels can anchor in the middle of either of the coves at the head of the bay, but the available space in these is very limited.

A vessel approaching Ambong bay from northward should keep Mount Kina Balu (chart 287), if visible, bearing 135°, or Tanjong Perunjuk bearing about 151°, either of which leads north-eastward of Belcher shoal; thence she should steer to pass not less than 2½ cables westward of Tanjong Perunjuk, and thence to the anchorage.

Approaching from westward the vessel should steer for the southern extremity of Pulau Usukan (page 141), bearing 041°, open north-westward of Tanjong Sak (*see* below), or Pulau Jaga (*see* below), in line with Roberton hill, which has a conspicuous grassy summit, 614 feet (187m1) high, about 1¼ miles north-eastward, bearing 064°, which lead north-westward of Belcher shoal, until Tanjong Perunjuk bears more than 135°, when the directions given above should be followed.

Small vessels can pass midway between Tanjong Ambong and Rodney Mundy shoal (*Lat. 6° 20′ N., Long. 116° 17′ E.*).

Coast.—Dangers.—Tangah bay is entered between Tanjong Perunjuk and Tanjong Tangah, about one mile northward. A flat, on which there are some rocks above water and others which dry, extends about 3 cables from the head of the bay. A spit, with depths of less than 3 fathoms (5m5) over it, extends 2¼ cables west-south-westward from Tanjong Tangah. There is a village at the head of the bay. Saundal bay is entered between Tanjong Tangah and Tanjong Saundal, one mile northward. Pulau Jaga, a conspicuous, cliffy, sandstone island, 150 feet (45m7) high and thickly wooded, lies about 3½ cables south-south-westward of Tanjong Saundal, to which it is joined by a bank, with a least depth of 3 feet (0m9) over it; this bank also extends about 1¼ cables south-eastward from the island. A rock, with depths of less than 6 feet (1m8) over it, lies about 3¼ cables south-eastward of Tanjong Saundal and about 1¼ cables offshore.

Tangah and Saundal bays are open westward, but afford shelter during easterly winds.

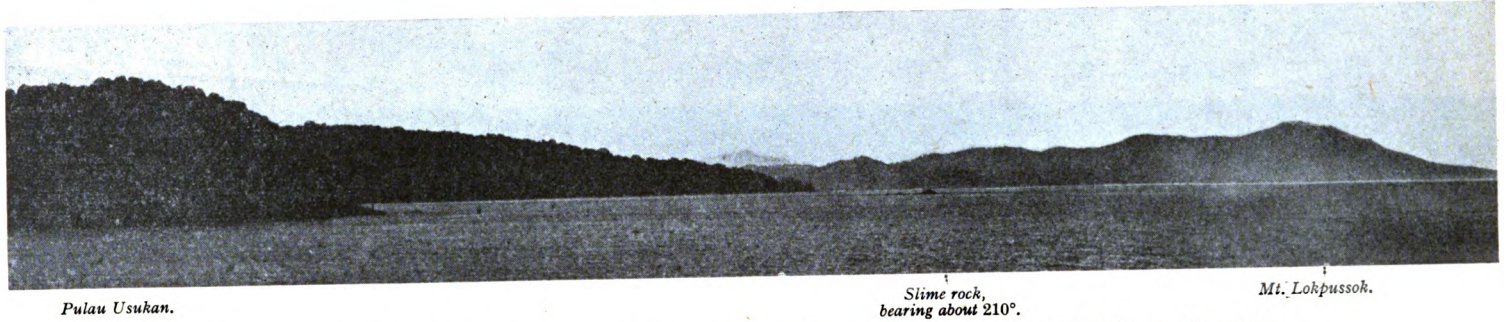
Preston shoal, with a least depth of 3 fathoms (5m5) over it, lies about 7 cables north-westward of Tanjong Saundal.

The coast between Tanjong Saundal and Tanjong Sak, about 1¼ miles

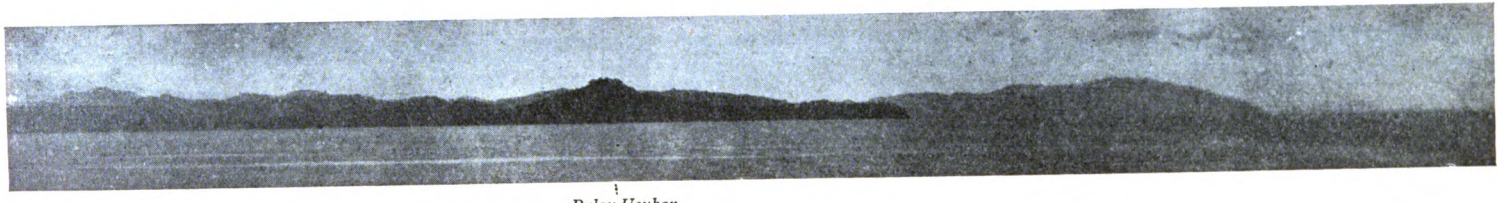
Digitized by Google

To face page 140.

Approach to Usukan bay from westward.
(*Original dated* 1918.)



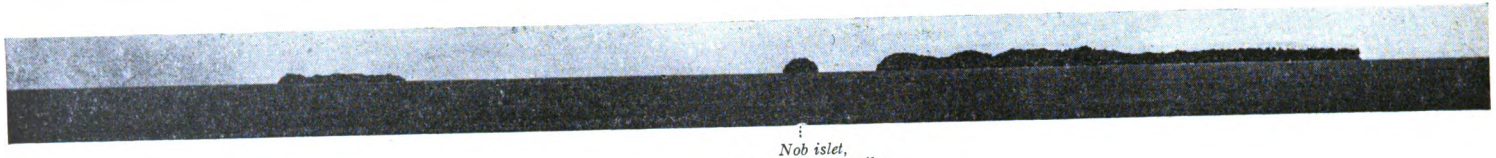
Approach to Usukan bay from one mile northward of Pulau Usukan.
(*Original dated* 1918.)



Approach to Usukan bay from northward.
(*Original dated* 1918.)

Digitized by Google

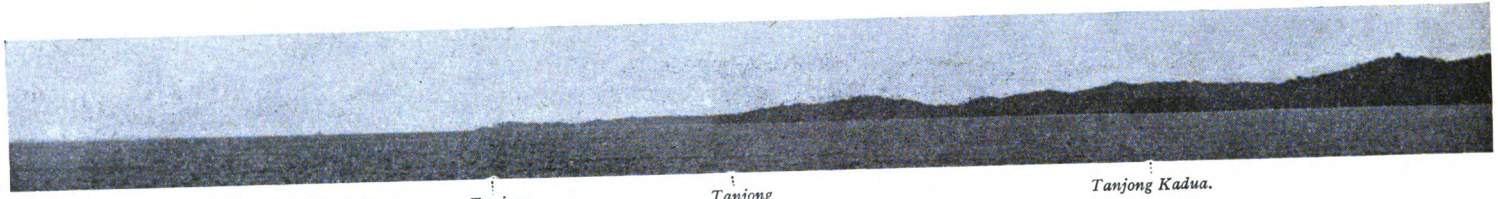
To face page 141.



Nob islet,
bearing 343°, 7 miles.

Mantanani islands.

(*Original dated* 1918.)

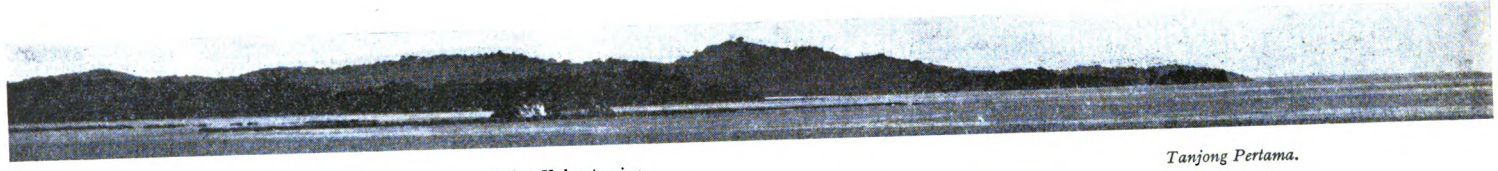


Pulau Kalampunian.

Tanjong Sampanmangio, bearing 063°, 10 miles.

Tanjong Pertama.

Tanjong Kadua.



Tanjong Pertama.

Pulau Kalampunian, bearing 190°, 2 miles.
(Lighthouse not shown.)

Two views of north-western end of Borneo.

(*Originals dated* 1918.)

Digitized by Google

Chart 1778.

north-eastward, is fringed by a bank, with depths of less than 3 fathoms (5m5) over it, extending about 2¾ cables offshore. A 4¾-fathom (8m7) patch lies about 4 cables northward of Tanjong Saundal and about 2½ cables offshore.

Sunk rock, which dries 5 feet (1m5), lies near the extremity of a spit, with depths of less than 3 fathoms (5m5) over it, extending about a quarter of a mile west-north-westward from Tanjong Sak (*Lat. 6° 22′ N., Long. 116° 19′ E.*); there are several patches, with depths of from 3 to 4½ fathoms (5m5 to 8m2) over them, within one cable of this rock, and a shoal, with a least depth of 3¾ fathoms (6m9) over it, lies about 2½ cables north-westward of it. The extremity of Abai bluff (page 142), bearing 068°, seen between Pulau Usukan and the mainland leads north-westward of these dangers.

Chart 2112.

When viewed from northward, the vicinity of Usukan and Ambong bays may be identified by the peculiar manner in which the high peaks approach the coast. Pulau Usukan, which lies on the north-eastern side of the entrance to the former bay, is a prominent feature on the coast, and appears as a black bushy cone; near it, the rounded summits of the mountains on the mainland appear to rise from a level plain.

Chart 1778.

Usukan bay.—Dangers.—Usukan bay, entered between Tanjong Sak and the western extremity of Pulau Usukan, about 1½ miles northward, is the best protected anchorage on this coast northward of Gaya bay; there is a Government settlement and a Custom house here, and a lightly constructed pier, alongside which small coasting vessels can lie. There is regular steamer communication with other ports in British North Borneo; the Custom house is connected by telephone to the Government station at Kotabelud. The port is the principal outlet of trade from the interior. Cattle are procurable from Abai village (page 142). (*See* views facing page 140.)

Reefs extend about 1¾ cables from the shores of the bay except in the small cove near the settlement, in the south-eastern corner of the bay. Shelter point lies about half a mile east-south-eastward of Tanjong Sak.

Bay hill, 603 feet (183m8) high, and Camp hill, 434 feet (132m3) high, situated about 1½ miles south-eastward and 1¾ miles eastward, respectively, of Sak point, are conspicuous grassy hills.

The north-eastern shore of the bay is formed by the south-western sides of Pulau Usukan and the peninsula of the mainland south-eastward of it.

Pulau Usukan, partly covered with trees, rises to an elevation of 470 feet (143m3); its grassy slopes and hill tops, standing out in contrast to the dense forest on the mainland, render it conspicuous. A sandspit, which dries 3 feet (0m9), connects the south-eastern point of Pulau Usukan to the extremity of a peninsula of the mainland about 3 cables southward.

From the western extremity of Pulau Usukan, a bank, with depths of less than 3 fathoms (5m5) over it, extends nearly three-quarters of a mile south-westward; Iris rock, which dries 3 feet (0m9), and Slime rock, 14 feet (4m3) high and conspicuous, lie on this bank about a quarter of a mile and half a mile south-westward, respectively, of the

Digitized by Google

Chart 1778.

point. A rock, which dries 6 feet (1m8), lies close north-eastward, and another, with a depth of less than 6 feet (1m8) over it, about one cable southward of Slime rock.

Reyne shoal, with a depth of 4 fathoms (7m3) over it, coral, and steep-to, lies in the outer part of the bay, about 7 cables north-eastward of Tanjong Sak.

Anchorages.—Directions.—The anchorage is in a depth of about 8 fathoms (14m6), mud, about 5½ cables westward of the pier at the settlement; small vessels can anchor, in a depth of about 7 fathoms (12m8), about 3 cables east-south-eastward of Shelter point, where they will obtain shelter from the prevailing swell during the summer months.

Approaching from westward a vessel should steer for Abai bluff (*see* below), bearing 068°, seen between Pulau Usukan and the mainland, until Shelter point (*Lat. 6° 22′ N., Long. 116° 20′ E.*), bearing about 111°, opens north-eastward of Tanjong Sak, when she should steer for the Custom house, bearing about 096°, until north-eastward of Tanjong Sak, when course may be altered for the anchorage.

From northward, after passing Alert rock (page 143), the vessel should steer for Pulau Jaga, bearing 187°, and open westward of Tanjong Saundal, which leads about 3 cables westward of the dangers off Slime rock; when Slime rock bears 050°, she should steer for the Custom house, bearing about 104°, which leads about 1¾ cables southward of Reyne shoal, and thence to the anchorage.

Chart 2112.

Coast.—Between Pulau Usukan and Tanjong Kranga, about 12 miles north-eastward, the coast facing the extensive Pindasan plain, is low, with a sandy beach on which the sea breaks heavily, rendering landing dangerous if not impracticable.

Chart 1778.

Kuala Abai, entered between Pulau Usukan and Abai bluff, about half a mile east-south-eastward, is separated from Usukan bay by that island and the peninsula of the mainland south-eastward of it.

Between the bar, which consists of hard sand, and had, in 1909, a least depth of 3 feet (0m9) over it, and a ferry which crosses the river about 2 miles above it, the river had depths of from 2 to 3 fathoms (3m7 to 5m5); thence its course becomes tortuous and it loses itself in swamps about one mile higher up. Owing to the swell and rollers, the anchorage off the river entrance is unsafe.

The village of Abai is situated inside Abai bluff. Vessels wishing to communicate with Sungei Abai will find it more convenient to anchor in Usukan bay, from which a boat passage, with a depth of 3 feet (0m9) at high water, leads southward of Pulau Usukan to the river entrance.

Chart 2112.

Sungei Tampassuk, entered about 3 miles north-eastward of Abai bluff, is barred by a sandbank, and is only available to boats at high water under favourable conditions; this river, which rises in the watershed of Mount Kina Balu, is subject to sudden freshets.

Sungei Pindasan, situated close southward of Tanjong Kranga, is only available to boats, at high water, under favourable circumstances; from the cliffy northern side of the entrance rocks, extend some distance offshore. Above the village of Pindasan, which stands about one mile eastward of the bar, the river is lost in swamps.

Charts 287, 2660b, 1263.

Digitized by Google

Chart 1778.

Off-lying dangers.—Alert rock, on which the sea breaks, situated about 1¼ miles northward of the western extremity of Pulau Usukan, dries about 6 feet (1m8) and is steep-to. A rocky spit, with depths of less than 5 fathoms (9m1) over it, extends about 1½ cables southward from the rock; the inner eastern entrance point of Sungei Abai, bearing 160°, open eastward of the eastern extremity of Pulau Usukan, leads eastward of Alert rock.

Chart 2112.

Mayne rock, with a least depth of 1½ fathoms (2m7) over it, lies about 3 miles north-westward of Alert rock, and North Hill rock, with a depth of 1½ fathoms (2m7) over it, lies about 2½ miles north-north-eastward of Alert rock.

Arsat rocks, on which the sea generally breaks, consist of two small rocks, which dry about 6 feet (1m8), situated about 4½ miles west-south-westward of Tanjong Kranga; a spit, with a depth of 2 fathoms (3m7) over it, extends about a quarter of a mile north-eastward from these rocks. The south-eastern extremity of Pulau Usukan (*Lat. 6° 24′ N., Long. 116° 20′ E.*) in line with the north-western extremity of the land near Tanjong Sak, bearing 216°, leads about a quarter of a mile north-westward of these rocks.

Coast.—Dangers.—Tanjong Kranga is a moderately high sloping grassy point, rising about 1¾ miles east-north-eastward to an elevation of 926 feet (282m2). A reef extends about half a mile northward from the point, and on its outer end are the two Ant islets, one of which is 75 feet (22m9) high.

Ant rocks, one foot (0m3) high and steep-to, lie about a quarter of a mile north-westward of the Ant islets, from which they are separated by a channel, with a depth of 7 fathoms (12m8); the outer rock lies close to the 10-fathom (18m3) line. Vessels should not attempt to pass inshore of these rocks.

Aspect.—Sir James Brooke range commences at Mount Madalon, a rounded peak, 3,957 feet (1,206m1) high, situated about 9½ miles north-north-westward of Mount Tambuyukon (page 137), from which it is separated by a deep valley. Thence the range extends to Mount Royalist, 2,382 feet (726m0) high, about 12½ miles north-north-eastward, and thence to Mount Cochrane, a rounded summit, 2,600 feet (792m5) high, about 3¼ miles farther north-north-eastward; northward of this the mountains decrease in elevation, ending in a flat plain stretching from Tanjong Agal (page 144) to Marudu bay (page 146). Station hill, 1,390 feet (423m7) high, situated about 8 miles north-north-eastward of Mount Cochrane, is conspicuous.

At Tanjong Katiga, about 6½ miles north-eastward of Tanjong Agal, hills recommence and extend to Tanjong Sampanmangio (page 146).

Coast.—Dangers.—Tanjong Gasap lies about 5½ miles north-eastward of Tanjong Kranga; between them the coastal bank, with depths of less than 3 fathoms (5m5) over it, extends about half a mile offshore in places. A steep-to coral reef, which dries 4 feet (1m2), lies about half a mile north-north-westward of Tanjong Gasap, and a 1¾-fathom (3m2) patch lies about the same distance west-south-westward of the point.

Umpohl shoals, with least depths of 5 fathoms (9m1) over them, lie about 1¼ miles north-north-eastward of the Ant rocks; a shoal, with

Digitized by Google

Chart 2112.

a depth of 3 fathoms (5m5) over it, lies between them, about half a mile north-eastward of the latter.

Between Tanjong Gasap and a point about 3¼ miles north-eastward, off which Pulau Bisa lies, the coastal reef extends about 3 cables offshore. Pulau Bisa is a thickly wooded islet, composed of black basalt, 220 feet (67m1) high, joined at low water to the mainland.

A coral patch, with a depth of 8 fathoms (14m6) over it, lies about 2½ miles westward, and one, with a depth of 7 fathoms (12m8) over it, about one mile north-westward of Tanjong Gasap.

Two coral shoals, with depths of 2½ fathoms (4m6), and 3 fathoms (5m5) over them, lie, respectively, about half a mile, and 1½ miles south-westward of Pulau Bisa.

White Rocks bay and approaches.—Dangers.—White Rocks bay, the approaches to which are obstructed by reefs and shoals, is entered between Pulau Bisa and Tanjong Jahat, about 7 miles north-north-eastward.

A 4½-fathom (8m2) patch lies in the southern approach to this bay, about one mile north-eastward of Pulau Bisa.

Harry shoals, with a least depth of 1¼ fathoms (2m3) over them, lie about 2½ miles north-eastward of Pulau Bisa; these shoals are almost joined to the mainland south-eastward by a spit extending from the latter.

Beehive rocks are two remarkable rocks near the outer end of the coastal reef on the south-eastern side of the bay. The south-western rock, 38 feet (11m6) high, lies about 4 miles north-eastward of Pulau Bisa; the north-eastern rock, 34 feet (10m4) high, lies about three-quarters of a mile farther in the same direction.

White rocks, about 3½ miles north-north-eastward of Pulau Bisa (*Lat. 6° 39′ N., Long. 116° 34′ E.*), are a conspicuous group of rocks, the highest of which has an elevation of 43 feet (13m1); from these rocks reefs extend about 2 miles northward, and one mile south-south-westward; White Rocks reef, the northern reef of the group, dries 4 feet (1m2).

A 6½-fathom (11m9) rock lies about 1½ miles south-westward of White rocks.

A shoal, with a depth of 4 fathoms (7m3) over it, lies in the northern entrance to the bay about one mile west-south-westward of Tanjong Jahat.

Anchorage. — Directions. — The anchorage is in a depth of 11 fathoms (20m1) near the middle of the bay, about 1½ miles north-eastward of White rocks.

A vessel entering by the southern entrance, should keep the north-western extremity of Pulau Bisa astern, bearing 217°, until the south-western Beehive rock bears about 081°, when course can be altered as necessary for anchoring.

By the northern entrance, the vessel should steer for the north-eastern Beehive rock, bearing 154°, and anchor as directed above.

Coast.—Dangers.—Between Tanjong Jahat and Tanjong Ganda, a rocky bluff about 2 miles northward, a bank, with depths of less than 3 fathoms (5m5) over it, extends about 8 cables offshore; a detached shoal, with a least depth of 4 fathoms (7m3) over it, lies about 1½ miles west-north-westward of Tanjong Jahat.

Between Tanjong Ganda and Tanjong Agal, about 4¾ miles north-

Digitized by Google

Chart 2112.

ward, the coast forms a bight, at the head of which is Agal bay. Rocks and shoals, with depths of less than 5 fathoms (9m1) over them, extend in places for about 1½ miles from this stretch of coast; the outermost shoals are a 2½-fathom (4m6) patch about 1¼ miles northward of Tanjong Ganda, a 5½-fathom (10m1) patch about 1½ miles farther northward, and a 4½-fathom (8m2) patch about 1¾ miles west-south-westward of Tanjong Agal.

Agal bay is obstructed by reefs which extend from both shores, but is reported to afford secure anchorage for small craft with local knowledge, in a depth of about 4 fathoms (7m3), during the North-east monsoon; Sungei Garu discharges into the shallow head of this bay.

Tanjong Agal (*Lat. 6° 52′ N., Long. 116° 38′ E.*) is low and difficult to distinguish; it derives its name from a species of fucus similar to trepang which is collected by fishermen on its rocky ledges. A narrow reef, on which there are several rocks, from 2 to 4 feet (0m6 to 1m2) high, extends about 1¾ miles westward from Tanjong Agal; Batumandi rock, 53 feet (16m2) high, composed of yellow sandstone, surrounded by a steep-to reef, lies about a quarter of a mile westward of the extremity of this reef, from which it is separated by a narrow passage.

A rock, with a depth of less than 6 feet (1m8) over it, lies about half a mile north-westward of Batumandi rock.

Outlying islands and dangers.—Light.—Mantanani islands consist of a group of coral islands connected by reefs, lying on a bank, with depths of less than 20 fathoms (36m6) over it, situated about 12 miles west-north-westward of Tanjong Gasap.

Tree island, the eastern island of the group, is low, flat and densely wooded, except near its north-western extremity, where it rises abruptly to a well defined wooded ridge, 270 feet (82m3) high. Nob islet, with a rounded summit, 205 feet (62m5) high, lies close westward of Tree island.

The western island is wooded, the trees near its western extremity having an elevation of 160 feet (48m8). (*See* view facing page 141.)

A light is exhibited, at an elevation of 155 feet (47m2), from a circular stone tower, 16 feet (4m9) in height, on the western Mantanani island.

Reefs fringe these islands and extend about one mile eastward from Tree island, and half a mile westward from the western island; the islands, which are uninhabited except during the season for collecting edible birds' nests, form a useful landmark. There is good anchorage on either side of these islands, according to the monsoon, and landing is easy.

A 6¼-fathom (11m4) patch and a 6½-fathom (11m9) patch lie about one mile southward and about 2¼ miles south-eastward, respectively, of the light-structure on the western Mantanani island. A bank, with a least depth of 7 fathoms (12m8) over it, lies about 5½ miles south-westward of the light-structure. A 6¼-fathom (11m4) patch lies about 2½ miles north-eastward of the eastern extremity of Tree island.

It is possible shoaler depths may exist in the vicinity of these islands, and vessels should navigate with caution.

South Furious shoals, discovered by H.M.S. *Furious*, in August, 1859, consist of a number of steep-to detached coral banks, with depths of more than 20 fathoms (36m6) between them, lying from about 4 to 13 miles north-westward of the Mantanani islands.

Charts 287, 967, 2660b, 1263.

Digitized by Google

Chart 2112.

The westernmost, and largest, of these banks has a least depth of 7 fathoms (12m8) over it; the next largest bank, with a least depth of 7 fathoms (12m8), lies about one mile farther eastward.

Three other banks, situated eastward of the above, have, respectively, least depths of 7, 8 and 8 fathoms (12m8, 14m6 and 14m6) over them. The depths around and between these banks are very irregular, and shoaler depths than charted may exist.

Westward of South Furious shoals there are other extensive banks, the limits of which have not been determined.

Barton shoal, with a least depth of 6½ fathoms (11m9) over it, lies about 8 miles northward of Tree island (*Lat. 6° 43′ N., Long. 116° 21′ E.*).

North Furious shoals, with a least depth of 7 fathoms (12m8) over them, coral, and with very irregular depths around, lies about 20 miles west-north-westward of Tanjong Agal.

Harington shoal, with a least depth of 7 fathoms (12m8) over it, coral, lies about 14 miles north-westward of Tanjong Agal.

Big Bonanza shoal, with a least depth of 2½ fathoms (4m6) over it, lies about 5 miles north-westward of Harington shoal.

Coast.—Dangers.—Between Tanjong Agal and Tanjong Katiga, a black rocky promontory, 410 feet (125m0) high, about 6½ miles north-eastward, and thence to Tanjong Sampanmangio, about 5½ miles farther north-eastward, there are heavy rollers. (*See* views facing page 141.)

Two detached cliffs, one 30 feet (9m1) high, of a reddish colour; the other 50 feet (15m2) high, and white, lie respectively, about one mile, and 2¾ miles east-north-eastward of Tanjong Agal; they are the only distinguishing features on this part of the coast. Sungei Kurina, navigable by boats at high water, discharges through the sandy beach close southward of the white cliff.

A 4½-fathom (8m2) patch, and a rock, which dries 6 feet (1m8), lie half a mile offshore and about one mile north-north-eastward, and 2¼ miles north-eastward, respectively, of Tanjong Agal.

A reef, which dries 4 feet (1m2), lies about half a mile offshore and about 4 miles north-eastward of Tanjong Agal; several shoals, with least depths of 1½ fathoms (2m7) over them, extend north-eastward from it, nearly to Tanjong Katiga.

Between Tanjong Katiga and Tanjong Kadua, about 2½ miles north-north-eastward, the coast is fringed by a reef, on the outer edge of which there is a rock, which dries 3 feet (0m9), about 6 cables north-north-eastward of Tanjong Katiga, and a rock, with a depth of less than 6 feet (1m8) over it, about 2 cables farther north-eastward. Sungei Ruru, which is closed by a reef, discharges about 1½ miles east-north-eastward of Tanjong Katiga.

Tanjong Pertama, about 1¼ miles north-north-eastward of Tanjong Kadua, rises to an elevation of 440 feet (134m1) about 6 cables within.

Chart 3728.

MARUDU BAY.—Marudu bay, into the head of which Sungei Marudu discharges, is entered between Tanjong Sampanmangio, the northern extremity of Borneo, and Cape Mafsie, 18 miles east-south-eastward.

Low hills rise from the western shore to an elevation of 600 feet

Digitized by Google

Chart 3728.

(182m9) ; Melau besar, 680 feet (207m3) high, about 1¼ miles westward of Pirate point, situated about 17 miles south-south-eastward of Tanjong Sampanmangio, and Matungun, 1,360 feet (414m5) high, 5 miles south-westward of Melau besar, are conspicuous, the summit of Melau besar being bare and flat, while Matungun is thickly wooded.

From the south-eastern shore the hills rise to an elevation of over 2,000 feet (609m6), and are all thickly wooded.

The rivers discharging into the bay shift their channels after each rainy season, and are only available for boats after the beacons have been replaced in position.

Anchorage.—Anchorage may be obtained, in depths of from 5 to 10 fathoms (9m1 to 18m3), mud, almost anywhere near the shores of the bay.

Pulau Kalampunian.—Light.—Pulau Kalampunian, 8½ cables northward of Tanjong Sampanmangio, is of sandstone formation, similar to the nearest bluff of that point, and rises abruptly from a flat, composed of detached reefs, to an elevation of 40 feet (12m2). A reef, which dries about 6 feet (1m8), extends about half a mile south-eastward from the island. (*See* view facing page 141.)

There is a safe channel about 4 cables wide between the island and Tanjong Sampanmangio, with a least charted depth of 6 fathoms (11m0) in the fairway. The reefs on either side are visible and can be easily avoided by a careful look-out from aloft.

A light (*Lat. 7° 03′ N., Long. 116° 45′ E.*) is exhibited, at an elevation of 85 feet (25m9), from an iron tower on a stone column, with red and white bands, 45 feet (13m7) in height, on Pulau Kalampunian.

Outer part of Marudu bay.—Dangers.—Beacons.—Tanjong Sampanmangio may be identified by the tall casuarina trees which stand on its grassy bluff, and by Pulau Kalampunian northward of it. Between the point and Tanjong Tajau, 6¾ miles south-eastward, the coast is bordered by rocks and the coastal bank, with depths of less than 5 fathoms (9m1) over it, extends half a mile offshore in places ; thence to Tanjong Kapor, which is 60 feet (18m3) high, about 4¾ miles south-south-eastward, the coast is foul for a distance of half a mile offshore.

The highest point of the extremity of Tanjong Kapor is Targett rock, which is 30 feet (9m1) high and is marked by a concrete block. Tanjong Agong Agong and Agong Agong river are about 1½ miles and 1¾ miles, respectively, south-south-eastward of Tanjong Tajau. Two 4½-fathom (8m2) patches and a 4¾-fathom (8m7) patch lie, respectively, about three-quarters of a mile east-south-eastward and 4 cables eastward of Tanjong Agong Agong.

Chart 946.

Between Tanjong Kapor and Tanjong Bornugus, the northern entrance point of Kudat harbour, one mile south-south-westward, a reef of sand and coral, which dries in patches, extends about 6 cables offshore. A shoal, with depths of 2 and 3 fathoms (3m7 and 5m5) over it, lies outside this reef, about 9 cables eastward of Tanjong Bornugus.

There is a short pier about 3½ cables north-north-eastward of Tanjong Bornugus.

Kudat harbour.—Kudat harbour is entered between Tanjong Bornugus (*Lat. 6° 53′ N., Long. 116° 51′ E.*) and Tanjong Tigasimil,

Digitized by Google

Chart 946.

1½ miles south-south-eastward. It affords anchorage in depths of from 4 to 7 fathoms (7m3 to 12m8), sheltered from the swell during the North-east monsoon by the reef which extends from Tanjong Bornugus. About one mile within the line joining the entrance points the depths shoal gradually from 3 fathoms (5m5) to the head of the harbour.

On the northern side of the harbour westward of the settlement there is a bay, with depths of less than 3 fathoms (5m5), entered between the point situated half a mile westward of Tanjong Bornugus, and Egeria bluff, about 1¼ miles farther westward; Bum Bun river, which has a depth of 1½ feet (0m5) on the bar, and from 2 to 4 fathoms (3m7 to 7m3) within for a distance of 1½ miles, discharges into the north-western corner of the bay. Telegraph wires cross the river mouth overhead, and are very low. About one mile westward of Egeria bluff the land attains an elevation of 411 feet (125m3).

At the head of the harbour there are three bays encumbered with shoals. Pangka'an bay, the southernmost, is entered about 3 miles westward of Tanjong Tigasamil; Tegarangan river discharges into the head of this bay, and has a depth of 1½ feet (0m5) in its entrance, and from 2 to 5 fathoms (3m7 to 9m1) within for a distance of 1½ miles.

Pamatadau river discharges into the head of the middle bay.

Lengkabang bay, the northernmost of the three bays, has a depth of 3 feet (0m9) in its entrance, and dries from one to 3 feet (0m3 to 0m9) about 5½ cables from its head. Langsana islet, 80 feet (24m4) high, lies just outside the entrance, and a rock, 2 feet (0m6) high, lies about 1½ cables north-eastward of the islet. Dampirit river discharges into the head of the bay.

Conspicuous objects when approaching Kudat harbour are Sandilands rock light-structure, the jetty, town flagstaff, Gueritz rock beacon, radio mast, and White rock (*Lat. 6° 52′ N., Long. 116° 49′ E.*).

Dangers.—Light.—Beacons.—Sandilands rock, with a depth of 1¼ fathoms (2m3) over it, lies in the middle of the entrance to Kudat harbour, and 9 cables south-eastward of Tanjong Bornugus.

A light is exhibited, at an elevation of 20 feet (6m1), from a white pile structure with red bands, on Sandilands rock.

Witti rocks are two rocks, with a depth of less than 6 feet (1m8) over them, lying about 1½ and 2¾ cables, respectively, northward of Sandilands rock light-structure. Close northward of each rock there is a 3-fathom (5m5) patch.

Tigasamil spit, which dries, extends about 4 cables north-eastward from Tanjong Tigasamil, with depths of from 3 feet (0m9) increasing to 2½ fathoms (4m6) at 1½ cables beyond. Near the north-eastern extremity of the spit is a beacon, which cannot be depended on. An islet, 20 feet (6m1) high, lies close off Tanjong Tigasamil. A reef, which dries, and on which is Tern rock, 4 feet (1m2) high, extends a quarter of a mile northward of the northern part of Tanjong Tigasamil.

Gueritz rock, with a depth of about 3 feet (0m9) over it, lies at the southern extremity of the reef which extends offshore between Tanjong Kapor and Tanjong Bornugus; it is marked at its southern extremity, 3¼ cables southward of Tanjong Bornugus, by a wooden beacon.

Datum rock, only covered at the highest spring tides, dries 6½ feet (2m0), and lies on the edge of the bank fringing the northern shore, 4 cables westward of Tanjong Bornugus.

A rock, with a depth of less than 6 feet (1m8) over it, lies in the

Digitized by Google

Chart 946.

middle of the harbour, about three-quarters of a mile west-south-westward of Datum rock.

White rock (*Lat. 6° 52′ N., Long. 116° 49′ E.*), 27 feet (8^{m}2) high, lies on the edge of the reef extending from the southern shore, about 2¼ miles westward of Tanjong Tigasamil; between them the southern shore is bordered by a reef extending a quarter of a mile off in places. The hills on the southern side of the harbour attain an elevation of 460 feet (140^{m}2).

Anchorage.—Directions.—The best anchorage is in a depth of about 6½ fathoms (11^{m}9), mud, southward of the settlement, with the flagstaff near Tanjong Bornugus bearing 354°, distant about 6½ cables and Sandilands rock light-structure, 085°; or, nearer the settlement if the draught permit.

Charts 946, 3728.

A vessel, after passing Pulau Kalampunian, should not close the coast within 2 miles; when abeam of Tanjong Tajau, Melau besar will be seen southward of Kudat harbour, and if kept open eastward of Tanjong Tigasamil, bearing 199°, will lead eastward of the reef extending from Tanjong Kapor, and of Sandilands rock; when Johnstone bluff, on the northern shore near the head of Kudat harbour, bears 275° she may steer for it on that bearing, passing between Sandilands rock and Tigasamil spit, thence she may steer for the anchorage.

Chart 946.

Tidal streams.—The tidal streams are weak, the maximum observed during a stay of three months being half a knot.

Kudat.—Kudat is a settlement situated on the northern point of the entrance to the harbour; it owes its importance to its being the distributing centre of the various tobacco and rubber estates in the vicinity.

The South-west monsoon is the most unhealthy period at Kudat; fever is then prevalent, whilst during the opposite season, with the wind coming across the sea, it is almost absent.

There are Government offices, including post and telegraph offices, and several churches; there is also a native hospital and a European cemetery.

A District officer resides at Kudat.

Beef, vegetables and fruit are plentiful. Bread is scarce. Water is laid on to the jetty.

The chief exports are tobacco, rubber and copra.

Jetty.—Pier.—Buoys.—There is a jetty, 132 feet (40^{m}2) in length, situated about 1½ cables westward of Tanjong Bornugus; there is a depth of 14 feet (4^{m}3) alongside it during the South-west monsoon, and about 2 feet (0^{m}6) more during the North-east monsoon. There is also a pier, 200 feet (61^{m}0) long, with a **T**-head.

There is a mooring buoy about a quarter of a mile southward of the eastern end of the jetty, and a hauling-off buoy.

Communication.—Radio station.—There is regular communication by steamer with Singapore and Sandakan.

Kudat is connected to the general telegraph system.

There is a radio station at Kudat. *See* page 21. The mast is situated about half a mile north-north-eastward of Tanjong Bornugus.

Charts 3728, 287, 967, 2660b, 1263.

Digitized by Google

CHAPTER VII

WEST COAST OF BALABAC ISLAND AND WEST COAST OF PALAWAN FROM CAPE BULILUYAN TO NORTH-WEST HEAD

Chart 948.

BALABAC ISLAND.—Aspect.—Balabac island, lying 49 miles north-north-eastward of the northern extremity of Borneo, and 17 miles south-south-westward of Cape Buliluyan (*Lat. 8° 20′ N., Long. 117° 11′ E.*), is thickly wooded. On the southern half of the island are several ranges of high hills; only a few, however, are of sufficient importance to require description. Steepfall range, about 2¼ miles northward of Cape Melville, the southern extremity of the island, is composed of several hills, from about 800 to 950 feet (243^{m}8 to 289^{m}6) high, the sides of which are steep, presenting a table-top appearance. Northward of this range, other ranges of from 800 to 1,400 feet (243^{m}8 to 426^{m}7) high, extend to Dalawan bay on the east coast. Balabac peak, 1,867 feet (569^{m}0) high, 7½ miles north-north-eastward of Cape Melville, is the summit of the island. Farther northward other ranges extend as far as Calandorang bay, situated on the east coast, 4¾ miles southward of Andeyro point, the northern extremity of the island. In the northern part of the island are several detached hills, the highest of which, situated about 3 miles southward of Andeyro point, has an elevation of 735 feet (224^{m}0). *See* view facing this page.

Climate and weather.—*See* page 22.

Pilotage.—*See* page 7.

Western side of Balabac island. — Dangers. — Light. — Cape Melville is fringed by a reef which extends half a mile offshore, and, between it and the point about 2 miles west-north-westward of it, there are detached patches, with depths of from 3 feet to 3½ fathoms (0^{m}9 to 6^{m}4) over them, lying within 1¼ miles of the coast.

A light is exhibited, at an elevation of 296 feet (90^{m}2), from a yellow octagonal masonry tower, about 1½ miles north-westward of Cape Melville. *See* view facing page 42. In 1941, the light was reported to be partially obscured by trees.

Taritip point, about 8½ miles north-westward of Cape Melville, is the south-western extremity of a promontory which shows up distinctly when viewed from north-westward and south-westward.

The west coast of Balabac is fronted by numerous dangers, the most important of which are Gnat reef, Balabac Great reefs, Ada reef and North-western shoals, while seaward of them are South-western banks and Western shoals.

Gnat reef, which dries in the middle, lies about 3½ miles north-

Digitized by Google

To face page 150.

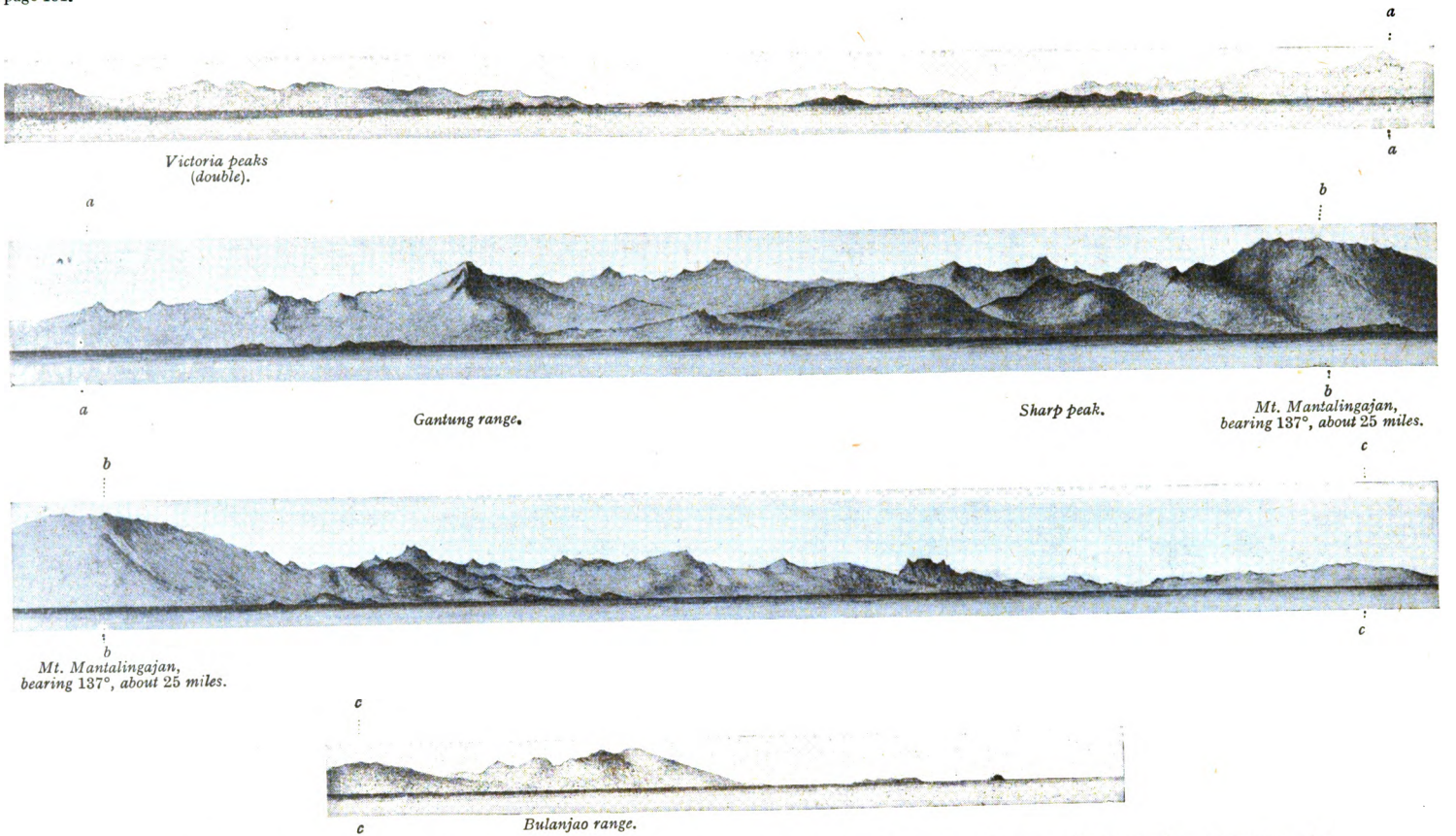
Balabac I. peak,
bearing 095°, 20 *miles.*

Western approach to Balabac strait.

(*Original dated* 1853.)

Digitized by Google

To face page 151.



View, in four parts, of the west coast of Palawan, from Victoria range to Bulanjao range.

(*Original dated* 1853.)

Digitized by Google

Chart 948.

westward of Cape Melville. South-western banks, with a least depth of $3\frac{3}{4}$ fathoms (6^m9) over them near their south-eastern end, lie about $2\frac{1}{2}$ miles south-westward of Gnat reef. In 1932, a prominent wreck with its hull showing, lay near the south-eastern end of the banks, about $4\frac{1}{2}$ miles west-south-westward of Cape Melville lighthouse.

Balabac Great reefs, which dry, extend from about 2 to 5 miles from the western side of Balabac island. There is a channel between these reefs and the island, about half a cable wide in its narrowest part south-westward of Ligas point, the western extremity of the island; there are numerous dangers in this channel. There is also a channel, in which there are several detached reefs, about half a mile wide, between Balabac Great reefs and Gnat reef; it leads to an anchorage about 2 miles southward of Ligas point. No vessel without local knowledge should use these channels.

Western shoals, with a least depth of $2\frac{3}{4}$ fathoms (5^m0) over them, lie parallel with Balabac Great reefs at a distance of about $2\frac{1}{2}$ miles, with a deep passage between, but there are several shoals, with depths of from $2\frac{1}{2}$ to 5 fathoms (4^m6 to 9^m1) over them, in it. Several shoals, with depths of from $5\frac{1}{2}$ to $6\frac{3}{4}$ fathoms (10^m1 to 12^m3) over them, lie within $5\frac{3}{4}$ miles of the southern part of the outer edge of Balabac Great reefs.

Ada reef, which dries, lies about $2\frac{3}{4}$ miles north-westward of Sigumay point, situated about 4 miles north-north-eastward of Ligas point (*Lat. 7° 57′ N., Long. 116° 56′ E.*). A 4-fathom (7^m3) patch lies about $3\frac{1}{2}$ miles west-north-westward of Ada reef, and an 8-fathom (14^m6) patch lies about .6 miles west-south-westward of the same reef.

Ramos island, the northern extremity of which is Cape Disaster, is separated from the northern end of Balabac island by Candaraman inlet, which is encumbered by islets and shoals (page 152). Martin hill, 350 feet (106^m7) high, lies on the southern side of the island, and there are two small cliffy hills near the middle of the island.

The western, northern, and eastern coasts of Ramos island are low; the coastal reef, which dries, extends nearly one mile offshore from the south-western and north-western sides of the island. A 5-fathom (9^m1) patch lies about one mile north-eastward of Cape Disaster and $6\frac{1}{2}$ cables offshore.

North-western shoals, with a least depth of 2 fathoms (3^m7) over them, lie off the western side of Ramos island, with a deep channel, about one mile wide, between the coral reef fringing the island and the 10-fathom (18^m3) line surrounding the shoal.

Directions.—When approaching the dangers off-lying the west coast of Balabac in the afternoon, when the sun will be astern, the outer shoals, and also the reefs will generally be seen in sufficient time to avoid them; but if the sun be ahead, the outer shoals are difficult to make out until close to them. The soundings are so variable and uncertain under depths of 30 fathoms (54^m9) as to afford little assistance. A good look-out is therefore of the first importance. At night, vessels should not approach to a less depth than 40 fathoms (73^m2) off the south-western and western parts of the island, nor get within 50 fathoms (91^m4) off the north-western part.

Tidal streams.—The tidal streams off the western and south-western sides of Balabac island follow the general direction of the edges of the reefs and run at a rate of from about one to $1\frac{1}{2}$ knots.

Charts 967, 2660b, 1263.

Digitized by Google

Chart 948.

Port Ciego. — Candaraman inlet. — Port Ciego at the western end of Candaraman inlet, is entered between Cliff point, the southern extremity of Paz islet, situated close off the western extremity of Ramos island, and Martinez point, about 2 miles south-south-westward. Coral reefs almost block the entrances, leaving deep but narrow channels, through which a strong tidal stream flows; heavy whirlpools and eddies are formed during spring tides.

Good anchorage may be obtained by vessels with local knowledge in Candaraman inlet, eastward or westward of Albay island, situated about $1\frac{1}{2}$ miles from Andeyro point, the southern point of the eastern entrance, in depths of from 4 to 7 fathoms (7^m3 to 12^m8), mud. In entering from westward a vessel should follow the edge of the reef extending from the south-western side of Ramos island, and pass northward of Sanz island, situated in the western entrance to Candaraman inlet. The reefs are easily seen with a rising tide and at high water, but with a falling tide and at low water they are often obscured by mud from the numerous mangrove inlets.

For Balabac strait, the east coast of Balabac island, and the islands of Balambangan, Banguey and Mallawallé, together with the dangers northward of them, *see* Eastern Archipelago Pilot, Vol. I.

Islands and dangers in North Balabac strait.—Secam island, about 100 feet (30^m5) high to the tops of the trees, lies $2\frac{1}{2}$ miles northward of Ramos island, from which it is separated by Bate channel, about $1\frac{3}{4}$ miles wide between the steep-to reefs extending from either side. The reef on which Secam island lies extends about $1\frac{1}{4}$ miles north-westward from the western extremity of the island, with coral patches on it which dry. Depths of from 4 to 9 fathoms (7^m3 to 16^m5) extend about three-quarters of a mile north-westward from the western edge of the reef.

Anchorage may be obtained off the northern side of Secam island (*Lat. 8° 11′ N., Long. 117° 01′ E.*), partially sheltered from south-westerly winds, in depths of from 19 to 20 fathoms (34^m7 to 36^m6), sand and coral, about three-quarters of a mile offshore, with the eastern extremity of the island bearing 180°; the reef westward affords protection from the swell.

In bad weather, a second anchor should be let go in time, as the squalls, which often succeed each other rapidly, are sometimes most violent.

Charts 948, 967.

Bancalan island, about $4\frac{1}{4}$ miles north-eastward of Secam island, is, except on its north-eastern side, fringed by a reef, which is usually discernible by the breakers and the discoloration of the water inside it, and extends $1\frac{3}{4}$ miles from the north-western side. There are several shoals, with depths of from 2 to 5 fathoms (3^m7 to 9^m1) over them, between the eastern extremity of Bancalan island and the reef which extends from the south-western extremity of Pandanan island. There are numerous coral patches, with depths of from one foot to $4\frac{3}{4}$ fathoms (0^m3 to 8^m7) over them, between the south-eastern side of Bancalan island and the north-western point of Mantangule island, about $2\frac{1}{4}$ miles south-eastward, and there are several shoals, with depths of from less than 6 feet (1^m8) to $3\frac{1}{4}$ fathoms (5^m9) over them, between Bancalan and Patongong islet, about $2\frac{1}{2}$ miles north-north-eastward.

Patawan islet lies about $1\frac{1}{4}$ miles north-north-eastward of the

Charts 2660b, 1263.

Digitized by Google

Charts 948, 967.

eastern extremity of Bancalan island; it is fringed by a coral reef which extends about 2 cables from its northern and western sides. There is a channel, with a depth of 8 fathoms (14m6), available for vessels with local knowledge, passing 2½ cables eastward of Patawan islet, leading to the deep channel southward of Patongong islet.

Chart 967.

Pandanan island, southward of Cape Buliluyan (page 154), is low, flat, and densely wooded; its coast is fringed partly with mangrove and partly with rock, about 10 feet (3m0) high. A small settlement is situated on the western side of the island. The area north-eastward of Pandanan island is encumbered with reefs which extend into Coral bay, which is situated on the south-eastern side of Palawan close north-eastward of Cape Buliluyan. The reef which fringes the south-western and southern sides of the island extends from about 2 to 2½ miles offshore.

Patongong islet (*Lat. 8° 17′ N., Long. 117° 07′ E.*) lies on the south-eastern edge of a coral reef, about 2 miles westward of the western extremity of Pandanan island.

Canimeran (Kanimeran) islet lies on the southern edge of a reef, about 1½ miles north-westward of the western extremity of Pandanan island. A tree, 40 feet (12m2) high, stands on the southern side of the islet and is an excellent landmark. A bank, with depths of from 3 to 4 fathoms (5m5 to 7m3) over it, extends about 2½ miles northward from the islet. Between Patongong and Canimeran islets there is a channel which is half a mile wide and clear of dangers in the fairway, which appears to be the best approach to the channel leading along the north-western side of Pandanan island.

About 8½ cables off the north-western side of Pandanan island lying on the south-eastern edge of a coral reef, is Dalahican island, with a deep channel, clear of dangers in the fairway, between. It is low and sandy, and planted with coconut trees.

Charts 948, 967.

Anchorages. — Directions. — Anchorage may be obtained by vessels with local knowledge anywhere within the area between Pandanan, Bancalan, and Mantangule islands clear of the shoals, in depths of from 7 to 15 fathoms (12m8 to 27m4), mud and sand.

During rough weather vessels with local knowledge are recommended to anchor in the southern entrance to the channel leading between Pandanan and Bugsuk islands, or in the channel itself; it is sheltered from the sea, but it is subject to strong winds in typhoon weather. Bugsuk island lies close eastward of Pandanan island.

The channels leading to the anchorages in this area are intricate, the best one appearing to be that northward of Bancalan island. The channel between the shoals extending from the northern side of that island and the reef fringing the southern side of Patongong islet is only about 3 cables wide, and should only be used when the reefs are distinctly visible.

To enter by this channel a vessel should keep well off the reef which extends from the north-western side of Bancalan island, and which is always well defined; she should steer for the southern extremity of Pandanan island, bearing 103°, until Canimeran islet opens eastward of Patongong islet, when she should steer 090° until the eastern extremity of Patongong islet bears 000°, when she should steer 037°, passing

Digitized by Google

Charts 948, 967.

half a mile south-eastward of that islet, which will lead into the main channel north-westward of Pandanan island.

During the North-east monsoon there is a better anchorage south-eastward of Patawan islet, in depths of from 9 to 13 fathoms (16m5 to 23m8), taking care to avoid the shoals eastward of Bancalan island and those eastward of Patawan islet. During the South-west monsoon anchorage may be obtained, in depths of from 9 to 15 fathoms (16m5 to 27m4), mud and sand, with the eastern extremity of Patongong islet bearing 000°, distant from 1¾ to 2½ miles.

Chart 967.

PALAWAN ISLAND.—The mountainous island of Palawan, one of the largest islands of the Philippine archipelago, separates the Sulu sea south-eastward, from the China sea north-westward. The island is sparsely inhabited and little is known of the interior.

The coasts of Palawan are indented by several bays and inlets, and fronted by numerous islands and reefs.

Caution.—Parts of the west coast of Palawan and the bank off it, have not yet been thoroughly surveyed, and less depths may exist on some of the shoals than is charted; vessels navigating in this locality should proceed with caution, and unless bound to one of its ports, should keep in depths of over 100 fathoms (30m5).

Coast.—Dangers.—Cape Buliluyan (*Lat. 8° 20′ N., Long. 117° 12′ E.*), the southernmost point of Palawan island, is a low shelving point fronted by mangroves, having on its southern and eastern sides depths of from 4 to 8 fathoms (7m3 to 14m6) close-to and from 28 to 30 fathoms (51m2 to 54m9) between its eastern side and the northern end of Pandanan island. The western side is fringed by a reef, which dries, extending from 3 to 5 cables offshore, with depths of 6 fathoms (11m0), mud, close to the edge. A 2¼-fathom (4m1) patch lies about one cable southward of the cape. Between the western side of the cape and the bank extending northward from Canimeran islet there are several coral patches, with depths of from 3½ to 7 fathoms (6m4 to 12m8) over them.

Aspect.—About 5½ miles north-north-eastward of Cape Buliluyan a range of hills commences, and trends parallel with the coast, about 1½ miles inland, for about 9½ miles; Mount Wangle, with a small triple summit, 980 feet (298m7) high, situated about 9 miles north-north-eastward of Cape Buliluyan, is the highest and most prominent peak of this range.

Canipan (Kanipan) hill, a steep conical hill with two peaks, 890 feet (271m3) high, lies near the eastern side of Tagugsom bay, about 9 miles north-north-eastward of Mount Wangle; except Bulanjao range, Canipan hill is the most prominent object on this part of the coast.

Bulanjao (Bulanhau) range, situated near the middle of the island, about 10 miles north-eastward of Mount Wangle, rises to an elevation of 3,470 feet (1,057m7) in Escarpado peak. It is of reddish colour, with a long smooth summit, of which it is difficult to distinguish the highest part. The southern part of this range rises gradually from the hills eastward of Canipan hill; on the northern slope there are several small sharp peaks, with steep sides, of which Low Hock, 1,600 feet (487m7) high, is the most prominent. Low Hock is usually visible when the adjacent hills are obscured. *See* view facing page 151.

Charts 2660b, 1263.

Digitized by Google

Chart 967.

Coast.—Dangers.—The coast between Cape Buliluyan and Reposo point, 8 miles northward, is fringed by a reef, which dries, extending as much as 6 cables offshore. Between Welcome point, about $3\frac{3}{4}$ miles northward of Cape Buliluyan, and Reposo point, numerous reefs, some of which dry, and shoals, with depths of less than 3 fathoms (5^m5) over them, extend $3\frac{1}{4}$ miles offshore.

Capyas (Kapyas) islet, 70 feet (21^m3) high, and wooded, lies on the eastern edge of a reef about $2\frac{1}{2}$ miles northward of Welcome point and about one mile offshore; it is connected to the mainland east-south-eastward by a reef. Good anchorage may be obtained by small vessels with local knowledge eastward of the islet.

Reposo point has a sandy beach by which it can be identified, and is fringed by a reef, which dries, extending about 6 cables westward and 7 cables north-westward. Reefs, which dry, and shoals, with depths of less than 5 fathoms (9^m1) over them, extend about 3 miles westward and $2\frac{1}{4}$ miles north-westward from the point.

Between Reposo point (*Lat. 8° 28′ N., Long. 117° 13′ E.*) and Gandan point, the termination of a wooded promontory, about $6\frac{1}{2}$ miles north-north-eastward, the coast is mostly bordered with mangroves and fringed by a reef, which dries and is steep-to, extending three-quarters of a mile offshore in places. Panimusan point lies about midway between the two points.

Canipan bay is entered between Gandan point and Bonbon point, about $2\frac{1}{2}$ miles north-north-eastward; it is encumbered with shoals, and a patch, with a depth of about 4 feet (1^m2) over it, on which the sea breaks, lies about $1\frac{1}{4}$ miles northward of Gandan point. Rocky patches, with depths of from $2\frac{1}{4}$ to 5 fathoms (4^m1 to 9^m1) over them, extend about 2 miles north-westward from the same point. Bonbon point may be identified by the low wooded hills and a cliff at its extremity, visible from northward.

Canipan river discharges over a sandy beach into the head of Canipan bay; it is navigable by small craft at high water.

Tagugsom bay, the entrance to which, between Bonbon point and Latud point, about one mile north-eastward is almost closed by reefs. A detached shoal, on which the sea breaks, lies half a mile north-westward of Bonbon point. A sand spit and coral reef, which dries, extend about one mile westward and north-westward from Latud point. There is good anchorage for vessels with local knowledge in this bay, protected from north-easterly and south-westerly winds.

The coast between Latud point and Providencia point, about $2\frac{1}{4}$ miles north-north-eastward, is fringed by a reef, which dries, extending as much as $6\frac{1}{2}$ cables offshore. Several shoals, with depths of less than 5 fathoms (9^m1) over them, lie within about $2\frac{1}{2}$ miles of this stretch of coast.

Tagbita bay is entered between Providencia point and Cliff point, about $2\frac{3}{4}$ miles north-north-eastward. Cliff point, on which there is a red cliff, rises to an elevation of 204 feet (62^m2) about a quarter of a mile north-eastward. Two green islets lie close together off Steep hill, a shoulder of the coastal range rising from the southern part of the bay. The head of the bay is divided into two inlets, the northern of which can only be entered by small boats at high water. Good anchorage may be obtained by vessels with local knowledge, in a depth of 10 fathoms (18^m3), south-westward of Cliff point.

Charts 2660b, 1263.

Digitized by Google

Chart 967.

Perigee shoal, with a depth of 2½ fathoms (4m6) over it, lies about 2½ miles north-westward of Providencia point; the sea breaks on it during strong winds. Between the shoal and Tagbita bay there are numerous shoals, with depths of from about 4 feet to 5 fathoms (1m2 to 9m1) over them. The coast between Bonbon point and Cliff point is dangerous to approach.

Tatub point is a bluff head with a small rock off it lying about 3¾ miles north-north-eastward of Cliff point. A reef, which dries, extends about 7 cables north-westward from the point situated about one mile south-westward of Tatub point, and foul ground extends about the same distance offshore between these two points. Close southward of Tatub point there is a sandy bay, the shores of which are bordered with casuarina trees.

Off-lying dangers.—Murex shoal, the position of which is doubtful, on which the s.s. *Murex* was reported to have struck in 1901, is apparently a small reef, situated about 15½ miles westward of Capyas islet (page 155); a 3-fathom (5m5) patch, on which there is possibly less depth, lies between them, about 6½ miles from the islet; about 1½ miles west-north-westward of the 3-fathom (5m5) patch there is a shoal patch on which the depth is not known. So far as is known Murex shoal is the southernmost of the outer dangers off the western coast of Palawan.

South Regent shoal, about 7½ miles westward of Panimusan point (*Lat. 8° 31′ N., Long. 117° 13′ E.*), is a coral and sand shoal, half a mile in extent, with a least depth of 1½ fathoms (2m7) over it, on which the sea breaks, and with depths of 15 fathoms (27m4) close-to.

Kamonga shoal, with a depth of 2 fathoms (3m7) over it, lies about 4¼ miles west-north-westward of Reposo point. A shoal, with a least depth of 3¼ fathoms (5m9) over it, lies about 1¾ miles south-south-westward of Kamonga shoal. A 3½-fathom (6m4) patch lies 1½ miles northward of Kamonga shoal. An extensive shoal, with a least depth of 2 fathoms (3m7) over it, and on which the sea breaks, lies from about 2 to 4 miles north-north-westward of Kamonga shoal. Two 3-fathom (5m5) patches lie about 1¼ and 2½ miles, respectively, northward of this shoal, and there are several shoals between the southern 3-fathom (5m5) patch and the coast, with depths of from 3¾ to 6¾ fathoms (6m9 to 12m3) over them.

Herefordshire shoal, on which the vessel *Herefordshire* struck in 1815, lies about 12½ miles west-north-westward of Panimusan point; shoal water has been reported to exist about 2 miles westward of this position.

North Regent shoal, about 9½ miles west-north-westward of Gandan point (page 155), is a steep-to coral shoal, about 4 cables in extent, with a least depth of 1½ fathoms (2m7) over it.

Breaker reef, with a least depth of about 4 feet (1m2) over it, lies about 7½ miles north-westward of Bonbon point (page 155), and is about 3 cables in extent. A shoal, with a least depth of 1¾ fathoms (3m2) over it, and a rock, with a depth of 2 fathoms (3m7) over it, lie about three-quarters of a mile southward and 1¼ miles westward, respectively, of Breaker reef.

Several shoals, with depths of from 4 to 7 fathoms (7m3 to 12m8) over them, lie from about 5 to 7 miles west-north-westward of Breaker reef.

Antelope shoal, a narrow ridge of sand and coral, with a least depth

Charts 2660b, 1263.

Digitized by Google

Chart 967.

of 1½ fathoms (2m7) over it, lies about 8 miles north-north-westward of Bonbon point. Between Breaker reef and Antelope shoal there are several shoals, with depths of from 4¾ to 6¾ fathoms (8m7 to 12m3) over them. Shoal water is reported to lie about 2½ miles westward and 2 miles north-westward of Antelope shoal. A 6-fathom (11m0) patch and a 4½-fathom (8m2) patch lie about 5 and 6½ miles, respectively, north-westward of Antelope shoal.

North-east Antelope shoal, about 4 miles north-eastward of Antelope shoal, has a least depth of 2¼ fathoms (4m1) over it, and is steep-to. A shoal, with a least depth of 1¾ fathoms (3m2) over it, lies three-quarters of a mile southward of North-east Antelope shoal, and other shoals, with depths of from 1½ to 4½ fathoms (2m7 to 8m2) over them, lie between Antelope and North-east Antelope shoals. A 4½-fathom (8m2) patch lies 1½ miles westward of North-east Antelope shoal, and two shoals, with least depths of 2¾ and 3¾ fathoms (5m0 and 6m9) over them, lie about one mile northward and 1¾ miles north-north-eastward, respectively, of the same shoal.

Coloby (Kolobe) shoal, with a depth of 3 fathoms (5m5) over it, and steep-to, lies 4½ miles westward of Tatub point.

Soundings give no indication of the proximity of the above mentioned shoals, but they can generally be seen from aloft. There are frequently large quantities of seaweed in this neighbourhood.

Between all the above mentioned shoals and the coast there are numerous other shoals, some of which are marked by breakers; the majority of these dangers are shown on the chart.

Coast.—The coast between Tatub point (*Lat. 8° 45′ N., Long. 117° 21′ E.*) and Mapankal point, 17 miles north-eastward, is indented by several bays, into some of which rivers discharge.

Aspect.—From Tatub point a ridge of hills extends eastward along the southern shore of Bulaloc bay (page 158); Balansungain peak, 827 feet (252m1) high, lies on this ridge about 2¼ miles eastward of Tatub point, and is prominent as it appears sharp from southward.

Iwiig range lies parallel with the coast close south-eastward of the hills described above; Double peak, near the middle of this range, is 1,785 feet (544m1) high, with flat shoulders. Northward of Double peak the range gradually slopes towards some low hills eastward of Bulaloc bay.

Pagoda cliff, about 8½ miles east-south-eastward of Tatub point, is a remarkable limestone cliff, 2,400 feet (731m5) high, with a table summit and a pinnacle at either extremity; between the pinnacles on the summit there is a small rock which is prominent from north-westward. Pagoda cliff rises directly above a plain, which extends across the island, between the Bulanjao and Mantalingajan ranges; it is connected to the latter by a high ridge on which are several peaks, similar to each other in formation. *See* view facing page 151.

Mount Mantalingajan (Mantalingahan), 6,740 feet (2,054m3) high, situated about 11½ miles north-eastward of Pagoda cliff, is of a reddish, barren aspect; when seen from westward it has a table summit, from which a long smooth shoulder slopes gradually southward, terminating in three small nipples.

There are several spurs and lower ranges between Mount Mantalingajan and the coast north-westward; the most remarkable of these is Sharp peak, 2,861 feet (872m0) high, situated about 5½ miles northward.

Charts 2660b, 1263.

Digitized by Google

Chart 967.

From Mount Mantalingajan a high central range extends north-eastward for about 20 miles; Mount Landargun, 5,430 feet (1,655m1) high, and Mount Gantung, 5,840 feet (1,780m0) high, situated, respectively, about 9 and 12½ miles north-eastward of Mount Mantalingajan, are the greatest elevations on this range.

Mount Calibugon (Kalibugon) (*Lat. 8° 59′ N., Long. 117° 52′ E.*), situated about 3 miles north-eastward of Mount Gantung, is a table-topped mountain, 4,730 feet (144m7) high, with a sharp nipple on its summit. Near the north-eastern extremity of the range Mount Corumi (Korumi), with a conical summit, rises to an elevation of 3,892 feet (1,186m3).

Montalay hill, detached, 530 feet (161m5) high and covered with trees, lies about 1½ miles south-eastward of Sumurumsum point, situated about 2 miles south-westward of Mapankal point; it is frequently visible when the higher land is obscured; a table-topped hill, 350 feet (106m7) high, lies about 1¼ miles north-eastward, and Binicayat, a conical hill, 340 feet (103m6) high, lies the same distance south-westward of it.

Mount Eran Quoin, 380 feet (115m8) high, lies about three-quarters of a mile inland, on the plain between Punta Baja and Eran point, situated about 7 and 11½ miles, respectively, north-eastward of Mapankal point.

Coast.—Dangers.—Bulaloc (Bulalok) bay is entered between Tatub point and Dita Dita islet, a bushy islet, 50 feet (15m2) high, connected to Balintang point, eastward by a reef, which dries, situated about 3¾ miles north-eastward.

Datag and Bucid are two sandstone islets lying about one mile and 1½ miles, respectively, north-eastward of Tatub point. Datag islet is flat and is almost connected to the shore of the bay about 3 cables southward, by a spit, which dries. Reefs, which are always visible, extend eastward and westward from these islets parallel with the shore. Bulaloc bay is encumbered with shoals, but there is a channel into it about 1½ miles south-westward of Dita Dita islet, passing through an opening in the reef about one cable wide, which leads to an excellent anchorage for small craft, in a depth of 9 fathoms (16m5), east-south-eastward of Bucid islet; a narrow reef, on which are some rocks above water, affords protection from northward.

There are numerous dangers in the approach to Bulaloc bay; a 2½-fathom (4m6) patch lies about 1¾ miles north-north-westward of Bucid islet.

Between Balintang point and Bacao Bacao point, about 5¼ miles north-eastward, the coast is fringed by a reef, which dries, and shoals, with depths of less than 3 fathoms (5m5) over them, extend about 2 miles offshore; soundings give no warning of the proximity of these shoals, and they are not always visible.

Culasian bay.—Dangers.—Culasian bay is entered between Bacao Bacao point and Sicud point, about 2½ miles north-eastward. The shore is a sand beach backed by a densely wooded plain. A hill, 110 feet (33m5) high, situated close southward of the mouth of Tagipan river, which discharges about 7 cables south-south-eastward of Sicud point, is a good mark from close offshore. Culasian river, the mouth of which is fronted by the coastal reef, discharges close eastward of Bacao Bacao point. There is a small settlement at Conduaga at the

Digitized by Google

Chart 967.

mouth of the river of the same name, about one mile north-eastward of the mouth of Culasian river.

A detached reef, with a least depth of 11 feet (3m4) over it, lies about 6 cables northward of Bacao Bacao point. A reef, on which the sea breaks, extends about 6 cables north-westward from the southern side of the mouth of Conduaga river.

Brechtel shoal, about one mile in extent, with a least depth of 3 fathoms (5m5) over it, lies in the approach to Culasian bay, about 2 miles north-westward of Bacao Bacao point. There are other dangerous shoals, on one of which the sea breaks, between Brechtel shoal and Sicud point. A reef, which dries in places, extends about 4 cables west-north-westward from Sicud point.

Small craft with local knowledge may obtain anchorage, in a depth of 4 fathoms (7m3), about half a mile northward of the settlement of Conduaga.

Coast.—Dangers.—Between Sicud point and Mapankal point there are small bays which are separated from each other by points, from which reefs, which dry, extend about half a mile. A rivulet, the entrance to which is protected by a coral reef, discharges into the bay about 1¼ miles southward of Mapankal point.

Ilog bay, which affords shelter for vessels with local knowledge from south-westerly winds, lies close eastward of Mapankal point (*Lat. 8° 58′ N., Long. 117° 33′ E.*). An almost unbroken shoal, with a least depth of 4 feet (1m2) over it, extends about 1½ miles northward from Mapankal point, and across the approach to this bay from westward. The western part of the bay is encumbered with shoals; the eastern part is clear, with depths of 5 fathoms (9m1), gradually decreasing to its sandy shore.

Between Mapankal point and Eran point the coast is low, densely wooded, and fronted by reefs, which dry in places, about three-quarters of a mile offshore. Outside the reefs, the depths off this stretch of coast are more regular than those southward of Mapankal point. Several shoal patches, with least depths of from 4½ to 6¾ fathoms (8m2 to 12m3) over them, lie from about 3 to 4 miles northward of Mapankal point.

Punta Baja is low, and planted with coconut trees, with dense forest behind them; a coral reef, which dries, extends about a quarter of a mile from this point.

Kinalang bay, entered close southward of Punta Baja, affords good shelter to vessels with local knowledge, protected from westward and north-eastward by coral reefs. The bay has depths of 8 fathoms (14m6) in the entrance, is clear of shoals, and has deep water close to the shore. The south-eastern shore of the bay is composed of densely wooded rocky cliffs, and there is a sandy beach on the north-eastern shore. Extensive shoals, with least depths of 2¾ fathoms (5m0) over them, lie about three-quarters of a mile north-westward of the entrance.

Punta Baja harbour, situated close southward of the point westward of Mount Eran Quoin (page 158), is fringed by flat coral reefs, and has room only for one vessel. The entrance, which is about three-quarters of a cable wide, has depths of from 9 to 10 fathoms (16m5 to 18m3), whilst in the middle of the harbour there are depths of about 4 fathoms (7m3). The harbour is available to vessels with local knowledge in all but exceptionally bad weather, when the sea breaks right

Charts 2660b, 1263.

Digitized by Google

Chart 967.

across it. Fresh provisions in moderate quantities are obtainable here.

Eran point, known locally as Ariringan point, is low, narrow and densely wooded; from it a reef, which dries, the inner end of which is covered with mangroves, extends nearly half a mile offshore.

Mantaya bay, southward of Eran point, is open northward, and has depths gradually decreasing from 5 fathoms (9m1) at the entrance, to the sandy beach at its head.

Eran bay.—Dangers.—Eran bay, which can be identified by Mount Eran Quoin (*Lat. 9° 03′ N., Long. 117° 40′ E.*), situated 2¼ miles south-south-westward of Eran point, is entered between Eran point and Tagbuaya (Aguada) point, about 4½ miles north-eastward; it is open northward. There are several detached shoals in this bay which are usually visible at low water.

Banisi point, at the head of Eran bay, about 2 miles south-eastward of Eran point, is low and covered with trees; from it a coral reef, which dries, extends about 1¼ miles northward. A small shifting sand cay, 2 feet (0m6) high, lies on this reef about a quarter of a mile northward of Banisi point.

Ira-an bay, the south-western part of Eran bay, westward of Banisi point, into which the Ira-an river discharges, is open northward, but affords good shelter from southerly winds. Coral reefs, which dry, extend from both sides of this bay, and a sandy beach stretches across its head. The depths in the bay decrease gradually towards the beach from about 7 fathoms (12m8) at the entrance.

Ira-an river is the largest in this vicinity; the approach to its entrance is shoal, and its gravel bar nearly dries.

Tagbuaya point is a low, densely wooded point, near the extremity of which there is a small coconut grove; a reef extends a quarter of a mile from the point, and submerged reefs and shoals lie within about 1¾ miles west-north-westward and north-north-westward of it. A one-fathom (1m8) patch lies about one mile south-westward of the point.

Tagbuaya bay, situated close southward of Tagbuaya point, affords good anchorage to vessels with local knowledge in northerly winds and is clear of dangers; the shores of this bay are heavily wooded, and the depths decrease gradually from about 8 fathoms (14m6) at the entrance to a sandy beach at the head. Tagbuaya river discharges into the head of Tagbuaya bay.

Off-lying dangers.—For a distance of about 17 miles off the coast, between Tatub and Eran points, there are numerous shoals, the positions of which can be seen on the chart. A few of the outer shoals are described below.

For North-east Antelope shoal, and dangers south-westward, *see* page 157.

Paragua ridge, a narrow ridge of coral, with a least depth of 5 fathoms (9m1) over it, rising from a bank of coarse sand and shells, lies about 16 miles north-westward of Tatub point; a 5½-fathom (10m1) patch lies about 1½ miles south-westward of this ridge. The outer side of these shoals is steep-to, with depths, in places, of from 60 to 70 fathoms (109m7 to 128m0) within 2 or 3 cables.

Merlin shoal patches, discovered by H.M.S. *Merlin* in 1885, have depths of from 1¾ to 5½ fathoms (3m2 to 10m1) over them, and lie from about 7 to 9½ miles north-westward of Tatub point.

Vanguard shoal, a coral patch, with a least depth of one foot (0m3)

Digitized by Google

Chart 967.

over it, lies northward of Merlin shoal patches, and about 12 miles north-north-westward of Tatub point.

Scalesby Castle shoal, with a least depth of 3 fathoms (5m5) over it, coral, and with depths of 30 fathoms (54m9) close-to, lies about 16 miles west-north-westward of Mapankal point. A chain of shoals, with depths of from 3¾ to 6 fathoms (6m9 to 11m0) over them, extend about 20 miles north-eastward from Scalesby Castle shoal, and close inside the 100-fathom (182m9) line.

Collingwood shoal consists of two heads, separated by a deep channel, about 12 miles north-westward of Eran point; there is a depth of 1¾ fathoms (3m2) over the north-eastern head and 1½ fathoms (2m7) over the south-western head. There are numerous shoals, with depths of from one to 6 fathoms (1m8 to 11m0) over them, on some of which the sea breaks, within 10 miles southward. A 2-fathom (3m7) patch, on which the sea breaks, lies about 4 miles north-north-eastward of the north-eastern head, and breakers have been reported about 2 miles farther northward and 3½ miles eastward of the 2-fathom (3m7) patch. A 5-fathom (9m1) patch lies 10 miles northward of Eran point. This locality has not been surveyed and should be avoided.

Coast.—Aspect.—The coast between Tagbuaya point and Isabel point (*Lat. 9° 10′ N., Long. 117° 46′ E.*), about 3¼ miles northward, and thence to Hummock point, 10 miles north-eastward, is low and indented by several bays, separated by low abrupt points, from which reefs, which dry, extend 3 or 4 cables; these bays are mostly free from reefs and have depths of from 2 to 3 fathoms (3m7 to 5m5) close to the shore.

False Sharp peak, which may be mistaken when first sighted for Sharp peak (page 157), rises close inland of Eran bay; between it and Mount Gantung is Waterfall peak, a bare rocky shoulder, from which there is usually a waterfall.

From Waterfall peak, False Corumi range, so called from the similarity of its northern features to those of the Corumi range, extends northward, westward of, and parallel with, Gantung range.

Pulute range lies about 7 miles inland, its highest point, with an elevation of 3,000 feet (914m4), being situated about 7½ miles north-north-eastward of Mount Corumi; The Nipple, 2,930 feet (893m1) high, rises from the northern slopes of the range, about 1¾ miles northward.

Point hill, 560 feet (170m7) high, rises from Hummock point; it is the northernmost peak of a range of hills 5 miles long, at the southern end of which is a hill with three summits. A high wooded mound rises from the plain south-westward of this range, between which and False Sharp peak there are other hills of nearly the same elevation.

Malanut range, situated about 3½ miles north-eastward of The Nipple, extends more than half-way across Palawan in an east-south-easterly direction; the greatest elevation on this range is Malanut peak, 1,650 feet (502m9) high. When seen end on from north-westward this range appears as a precipitous cliff with slips on the southern side.

Islands and dangers.—A pinnacle rock, with a least depth of 1½ fathoms (2m7) over it, lies about 1¼ miles north-north-westward of Isabel point; several shoals, with depths of from 4 to 8 fathoms (7m3 to 14m6) over them, extend about 6 miles north-eastward from the pinnacle rock, and from 1½ to 3 miles offshore.

Charts 2660b, 1263.

Digitized by Google

Chart 967.

Malapackun (Malapakkun) island, about 1½ miles offshore and 3 miles west-south-westward of Hummock point, rises to a double summit, 340 feet (103m6) high, and is covered with trees ; a small islet lies about 2 cables southward of it. Marantao islet, 247 feet (75m3) high, lies near the edge of the coastal reef, about one mile westward of Hummock point. There is a channel between Malapackun island and Marantao islet, with depths of from 9 to 10 fathoms (16m5 to 18m3), but it is not recommended.

Coast.—From Hummock point a steep-to reef, which dries in places, extends about 2½ miles north-north-eastward ; Nakoda island, about 200 feet (61m0) high, lies near the north-eastern extremity of this reef, about 2½ miles north-eastward of the point. The south-eastern extremity of Sirinao island (*see* below), bearing about 111°, and open northward of Nakoda island, leads northward of the reef.

Approaches to Nakoda and Malanut bays. — Dangers. — Triple Cima island, with three peaks, the highest rising to an elevation of 162 feet (49m4), lies about 3¾ miles north-eastward of Hummock point. A reef fringes the island, and a bank, with depths of less than 3 fathoms (5m5) over it, extends about three-quarters of a cable from its south-eastern end ; a 3-fathom (5m5) patch lies about 1¼ cables south-south-westward of the south-eastern extremity of the island.

A coral shoal, with a least depth of 5 fathoms (9m1) over it, lies about 6½ cables north-eastward of Triple Cima island (*Lat. 9° 19′ N., Long. 117° 56′ E.*).

Two shoals, with least depths of 1½ fathoms and one fathom (2m7 and 1m8) over them, lie, respectively, about 1¼ miles and 1¾ miles east-north-eastward of the south-eastern extremity of Triple Cima island. These shoals are apparently steep-to, and other shoals may exist in their vicinity.

Nakoda bay.—Dangers.—Nakoda bay is entered between Nakoda island and Albion head, on the mainland, about 2 miles east-south-eastward. Between Nakoda island and the mainland southward are the low mangrove islands of Mariquit, Maricaban and Mangle Butuan.

Sirinao island, 280 feet (85m3) high near its north-western end, lies in the entrance to Nakoda bay, which it protects from northward. Reefs fringe the island, except at its south-eastern end where there is a sandy spit ; these reefs extend about half a mile eastward from the island.

Albion head is a bold thickly wooded headland with several summits, rising to an elevation of 690 feet (210m3) half a mile southward, and with precipitous limestone cliffs, in which there are stalactite caves. From the north-western side of the head, reefs, which dry in places, extend nearly three-quarters of a mile offshore ; the channel between them and the reef extending from the eastern side of Sirinao island is about one cable wide, with a least depth of 4 fathoms (7m3) in the fairway ; it forms the eastern entrance into the harbour, but it is not recommended. The main entrance between Nakoda and Sirinao islands is about 4 cables wide, with a least depth of 6½ fathoms (11m9) in the fairway.

A reef, with depths of less than 6 feet (1m8) over it, lies about 3 cables eastward of Nakoda island ; the head of the bay, southward of a line joining Albion head and the southern extremity of Mariquit island, is obstructed by reefs, with depths of less than 6 feet (1m8) over them.

Charts 2660b, 1263.

Digitized by Google

Chart 967.

Anchorage.—There is fairly sheltered anchorage for small vessels with local knowledge, in depths of about 4 fathoms (7m3). The best position, during the North-east monsoon, is about 2 cables west-south-westward of the south-eastern extremity of Sirinao island; in the South-west monsoon, vessels should anchor south-eastward of Nakoda island, taking care to avoid the reef eastward of it.

Malanut bay.—Dangers.—Malanut bay, which affords shelter for vessels of moderate draught with local knowledge, is entered between Albion head and Bajallanura, a low flat island about one mile north-eastward. Reefs, which dry in places, fringe Bajallanura island, and extend about 1¼ miles north-westward from it.

Two shoals, with depths of 2 and 3 fathoms (3m7 and 5m5) over them, lie, respectively, about one mile north-eastward and north-north-eastward of the northern extremity of Bajallanura island.

Fairway reef, with depths of less than 6 feet (1m8) over it, lies nearly in mid-channel about 6 cables northward of Albion head (*Lat. 9° 17′ N., Long. 117° 59′ E.*); the channel north-eastward of this reef is about 1½ cables wide, and is the one recommended.

Malanut river, the entrance to which is obstructed by mud flats, which dry, discharges into the south-eastern part of Malanut bay. The head of the bay is fringed by a reef which extends about 4 cables offshore in places.

Near the mouth of a small stream at the head of the bay, about half a mile westward of the river's mouth, there are a few native huts marking the site of the old Spanish military post, named Alfonso XIII.

The tidal streams in the bay are scarcely perceptible.

Anchorage.—The best anchorage is in a depth of 5½ fathoms (10m1), stiff mud, about half a mile eastward of Albion head, or in a depth of about 3½ fathoms (6m4), about 6 cables nearer the settlement.

The best time to enter Malanut bay is at low water, when the reef westward of Bajallanura is dry; at high water the edge of this reef is not well defined.

Coast.—Dangers.—The coast between Bog point, about 2½ miles eastward of Albion head, and Durudeen point, about 2½ miles north-north-eastward, is fringed by a reef, which extends from about half a mile to one mile offshore. A shoal, with a depth of 6 feet (1m8) over it, lies about one mile northward of Durudeen point, and a 3-fathom (5m5) patch lies about 2¼ miles north-westward of the point.

Treacherous bay and approaches.—Treacherous bay is entered between Durudeen point and a point about 2½ miles north-eastward, from which a reef extends about one mile north-westward. Two remarkable hills lie close within the head of the bay. Devils Cap, rising from the mangrove-covered shore, is a prominent yellow cliff, 625 feet (190m5) high; Back Cap, 720 feet (219m5) high, lies about one mile south-eastward of Devils Cap.

Palm islet, 100 feet (30m5) high, lies about 4½ miles northward of Durudeen point; some dark rocks lie on a sandbank about a quarter of a mile north-eastward of this islet. Tide-pole island, 205 feet (62m5) high, with a rock on its north-western side, lies about three-quarters of a mile south-south-eastward of Palm islet. Patelan island lies about half a mile north-eastward of Tide-pole island.

Double island, consisting of two low flat islets connected by a sandy

Digitized by Google

Chart 967.

neck, lies between the islands described above and the mainland eastward; reefs, parts of which dry, extend about 6 cables south-westward and 4 cables westward from Double island.

The channel between Double island and the islands westward has a least depth of 8 fathoms (14m6).

A 7-fathom (12m8) patch lies about 5 miles westward of Palm islet, and a 4¼-fathom (7m8) patch lies 9 miles north-westward of the same islet.

Vessels are recommended to avoid this bay on account of the reefs in the approach, which, owing to the muddy state of the sea in this vicinity, are seldom visible.

Coast.—Aspect.—End peak, a prominent double-topped peak, 4,512 feet (1,375m3) high, and Sultan peak, 3,820 feet (1,164m3) high, lie near the southern end of a range about 8½ miles eastward, and 10 miles east-south-eastward, respectively, of Devils Cap.

Victoria peaks, a massive formation with several peaks with a maximum elevation of 5,665 feet (1,726m7), lies about 8 miles east-north-eastward of End peak.

From Victoria peaks the range trends north-eastward for about 12 miles, terminating in some moderately high land south-eastward of Long point (page 165). From this range, a number of lower ranges and spurs, divided by ravines and thickly wooded gorges, extend towards the coast. *See* view facing page 151.

From a range close westward of Victoria peaks (*Lat. 9° 23′ N., Long. 118° 20′ E.*) a spur extends westward, terminating at Steep point, situated about 11½ miles north-eastward of Durudeen point; at the head of the densely wooded valley northward of this range, below three sharp peaks on the ridge above, is a remarkable conical hill named Valley Cone.

Cuckold hill, 280 feet (85m3) high, lies close to the coast, about 2¾ miles north-north-eastward of Steep point.

Brow shoulder, 3,840 feet (1,170m4) high, situated about 7¾ miles north-north-westward of Victoria peaks, is the extremity of Gap range, which trends eastward from it for about 6 miles, and attains an elevation of about 5,000 feet (1,524m0); near the middle of this range there are two peaks. The northern side of the range is a steep slope, broken by deep ravines, with some conical hills at the foot, one of which, named Brow Cone, 1,180 feet (359m7) high, near Bluff point is prominent.

Coast.—Islands and dangers.—Between Treacherous bay and Bahia Honda point, about 4½ miles north-north-eastward, the coast is low and densely wooded; from it reefs and detached rocks extend in places for about 1½ miles offshore. The bay between Bahia Honda point and Steep point has depths of from 10 to 12 fathoms (18m3 to 21m9) about half a mile offshore. From Steep point to Bluff point, about 5½ miles north-eastward, a reef, the outer edge of which dries in places, extends about half a mile offshore; a black rock lies on this reef about one mile northward of Steep point, and a high rock lies near the shore of a small bay close southward of Bluff point.

A stream of fresh water enters the sea close northward of Cuckold hill.

Peaked islet, 110 feet (33m5) high, lies off the mouth of the stream mentioned above, about 1½ miles north-westward of Cuckold hill;

Digitized by Google

Chart 967.

reefs, which dry in places, through which there is a narrow passage, almost connect this islet to the mainland eastward.

A rock, 23 feet (7m0) high, lies about three-quarters of a mile westward of Peaked islet.

A shoal, with a least depth of 3 feet (0m9) over it, lies about half a mile southward, and another, with a depth of 4½ fathoms (8m2) over it, coral, about one mile westward of the 23-foot (7m0) rock. Foul ground extends about one mile south-westward from the former. Back Cap (page 163), bearing about 196°, open of the low land near Bahia Honda point, leads westward of these dangers.

A 6-fathom (11m0) patch lies about half a mile northward of Bluff point.

Moorsom point, about 3¼ miles north-eastward of Bluff point, is a rather prominent headland of moderate elevation; a sandy bay, into which two rivulets discharge, lies close northward of this point.

A small rock, above water, lies about half a mile westward of Moorsom point.

Between Moorsom point and Long point, about 7 miles north-north-eastward, there is a bay, near the head of which, about 1½ miles southward of Long point, is Apurauan point, from which foul ground extends about one mile westward.

A reef, awash, lies about one mile offshore, 1½ miles northward of Moorsom point, and between this reef and Apurauan point there are several other dangers.

There is anchorage for small vessels with local knowledge, sheltered from north-eastward, in depths of from 7 to 8 fathoms (12m8 to 14m6), stiff mud and shells, about half a mile offshore southward of Long point.

A few fresh provisions may be obtained at Apurauan village, close within Apurauan point.

Long point (*Lat. 9° 39′ N., Long. 118° 20′ E.*) is a densely wooded, rocky point, with several sandy bights, sloping upward to a moderate elevation about 1¼ miles inland; a reef extends about 2 cables northward, from the point.

Outlying dangers.—Numerous coral patches, with depths of from 4½ to 7 fathoms (8m2 to 12m8) over them, lie from one to 2½ miles inside the 100-fathom (182m9) line between the northern end of the chain of shoals (page 161) extending north-eastward from Scalesby Castle shoal, and a position about 25 miles north-eastward; these patches are usually visible from aloft. It is possible other shoals than those charted may exist in this locality, and it is recommended that it should be avoided.

A shoal, 23 miles long, on which the sea breaks, was reported, in 1926, to lie parallel with the coast with its southern end about 8 miles westward of Moorsom point. Breakers were also reported, by the Spanish gunboat *Albay*, in 1896, near the northern end of this area, about 9½ miles northward of Long point. A rock was reported, in 1944, about 3 miles eastward of the north-eastern end, and another, with a depth of 4½ fathoms (8m2) over it, about 13½ miles westward of the southern end of this area.

York breakers, a coral shoal, with a least depth of one foot (0m3) over it, on which the sea generally breaks except in fine weather, and with depths of 45 fathoms (82m3) close-to, lies about 18 miles north-westward of Long point. Several shoals, with least depths of from

Charts 2660b, 1263.

Digitized by Google

Chart 967.

3½ to 7 fathoms (6m4 to 12m8) over them, lie between 4 and 7 miles south-westward and southward of York breakers.

Coast.—Aspect.—Anepahan peaks are two peaks of nearly equal elevation, of which the northern is the sharper, situated about 8 miles eastward of Long point; on the gradually sloping range connecting them with that point there are several round topped hills which are usually visible when the more elevated land is hidden by clouds.

About 6½ miles north-eastward of Anepahan peaks, from which it is separated by a deep valley, a sharp shoulder, 3,606 feet (1,099m1) high, lies at the southern extremity of a range of mountains, which extend thence for about 23 miles north-north-eastward, to the head of Ulugan bay (page 168).

There are three remarkable peaks on this range; Mount Stavely, 3,890 feet (1,185m6) high, with a pinnacle summit rising from the centre of a table-top, which lies about 2¼ miles north-eastward of the sharp shoulder mentioned above; Thumb peak, with a dome-shaped summit, 4,220 feet (1,274m1) high, about 4½ miles north-north-eastward; and Mount Beaufort 3,645 feet (1,110m0) high, with a hollow in the highest part of its dome-shaped summit, about 2 miles farther north-eastward.

Between Mount Beaufort and Mount Herschel (*Lat. 9° 55′ N., Long. 118° 38′ E.*), 2,316 feet (705m9) high, situated about 6 miles northward, the range gradually decreases in elevation; a low ridge, on which stands Mount Airy, 2,045 feet (623m3) high, with twin summits, connects Mount Herschel with Mount Peel, about 6½ miles north-north-eastward.

Mount Peel, a bold rocky peak, 3,655 feet (1,114m1) high, rises abruptly from the ridge mentioned above; from its northern and western sides sharp ridges and deep ravines extend to the coast. About 2 miles east-south-eastward, Baheli peak, about 1¾ miles east-south-eastward of Mount Peel, with similar features, rises to an elevation of 2,350 feet (716m3), and slopes in a south-easterly direction to the east coast of the island. *See* view facing this page.

Chart 2913, plan of Ulugan bay.

Karsoglan hill, which, when seen from westward, appears quoin-shaped, lies near the coast, about 4 miles northward of Mount Peel, to which it is joined by a low ridge; between Karsoglan hill and North-west head the hills decrease in elevation, and are connected by low ridges.

Chart 967.

Coast.—Dangers.—Close northward of Long point is a bay, into which several rivulets discharge; the entrance to the largest of these is obstructed by coral reefs.

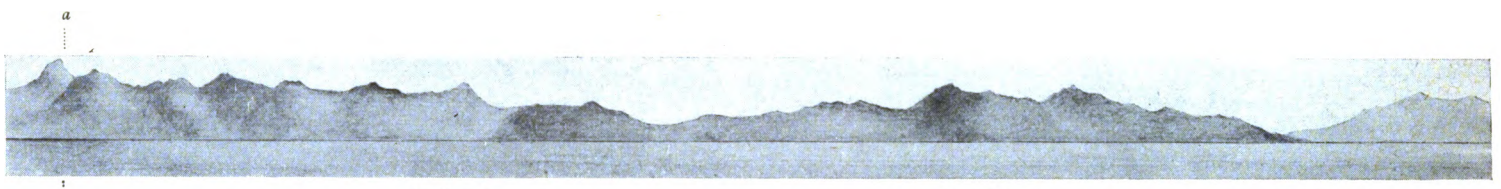
A rocky point, which forms the extremity of a spur of the Anepahan range lies about 10 miles north-eastward of Long point; the settlement of Anepahan is situated near some cleared ground on this spur. Coral reefs extend in places about 2 cables offshore, for about 2 miles on either side of this point.

South rock, 20 feet (6m1) high and steep-to, and North rock, which nearly covers at high water, lie about one mile offshore, and 2¾ and 4¾ miles, respectively, north-eastward of the northern side of Long point.

Two shoals, with depths of 3 fathoms (5m5) and 2 fathoms (3m7)

Digitized by Google

To face page 166.



View, in two parts, of the west coast of Palawan, from Ulugan bay to Apurauan.

(*Original dated* 1854.)

Cleopatra Needle, bearing 159°, 70 *miles.*

Four Peaks range from north-westward.

(*Original dated* 1880.)

Digitized by Google

Digitized by Google

Chart 967.

over them, lie, respectively, about three-quarters of a mile west-north-westward, and 2 miles westward of the point at Anepahan settlement, and a 3-fathom (5^m5) patch lies close offshore about 2 miles north-eastward of the same point.

Between Bluff point, a spur of Mount Herschel, situated about 13 miles north-eastward of Anepahan settlement, and Table point, a conical hill about 6 miles north-north-eastward, the coast forms a bight, at the northern end of which is Fish bay. There is a detached rock close off Bluff point. About 2 miles eastward of Table point, under a table range at the foot of Mount Peel, is a waterfall.

The Hen and Chickens, a group of islets and rocks, lie in the entrance to the bight described above about $1\frac{1}{2}$ miles westward of Sprat point, the southern entrance point of Fish bay. The group consists of three islets, the north-westernmost of which is about 80 feet (24^m4) high. A rock, which dries 2 feet (0^m6), with depths of 14 fathoms (25^m6) close-to, lies about $1\frac{1}{2}$ miles northward of the north-western islet.

Shoals, with depths of from $3\frac{3}{4}$ to $4\frac{1}{2}$ fathoms (6^m9 to 8^m2) over them, lie about three-quarters of a mile and one mile, respectively, north-westward of Sprat point, and a shoal, with a depth of $4\frac{1}{4}$ fathoms (7^m8) over it, lies about one mile west-north-westward of the same point. Shoals, with depths of from 2 feet to $4\frac{1}{2}$ fathoms (0^m6 to 8^m2) over them, were reported, in 1938, to lie in Fish bay.

Chart 2913.

Between Escabrosa point, situated about 6 miles north-eastward of Table point, and North-west head (*Lat. 10° 08′ N., Long. 118° 45′ E.*), about $4\frac{1}{4}$ miles north-north-eastward, the coast is bold and rocky with several high cliffs; there is a remarkable square patch on the hillside about the middle of this stretch of coast. Peaked rock lies near the outer end of a reef extending about $1\frac{1}{4}$ cables north-westward from the coast, about three-quarters of a mile north-eastward of Escabrosa point.

North-west head is a bold precipitous cliff, rising at about a quarter of a mile inland to North-west hill, 600 feet (182^m9) high; a detached rock, about 40 feet (12^m2) high, lies close to the extremity of this head. This head is the extremity of the peninsula which forms the western side of Ulugan bay (page 168).

Chart 967.

Outlying dangers.—Albay shoal, with a least depth of 6 fathoms (11^m0) over it, coral, reported, in 1888, by the Spanish gunboat *Albay*, and Middle shoal, with a least depth of $3\frac{1}{2}$ fathoms (6^m4) over it, lie, respectively, about $7\frac{1}{2}$ and 12 miles west-north-westward of Bluff point.

Two coral patches, with depths of 6 fathoms (11^m0) over them, lie, respectively, about $8\frac{1}{2}$ miles westward, and 11 miles north-westward of Middle shoal. A bank, with a depth of 8 fathoms (14^m6) over it, lies about $8\frac{1}{2}$ miles north-north-westward of the same shoal.

Duhme shoal, on which the sea breaks, was reported by the ship *Minerva* in 1882 to lie about 10 miles north-westward of Table point.

A $6\frac{3}{4}$-fathom (12^m3) patch lies about 12 miles west-north-westward of North-west head. Two shoals, with depths of $3\frac{1}{2}$ and 4 fathoms (6^m4 and 7^m3) over them, lie about 23 miles westward of the same head.

For the outlying shoals farther northward, *see* page 178.

Charts 2660b, 1263.

Digitized by Google

CHAPTER VIII

WEST COAST OF PALAWAN—NORTH-WEST HEAD TO CABULI ISLAND

Chart 2913.

ULUGAN BAY AND APPROACHES.—Aspect.—For North-west head, *see* page 167.

The approach to Ulugan bay is between North-west head and Piedras point, about 4½ miles north-eastward. The eastern side of the approach between Piedras point and Broken head (*Lat. 10° 07′ N., Long. 118° 49′ E.*), the eastern entrance point of the bay, 4¼ miles southward, is bold, with reddish brown cliffs formed by the spurs of a range of mountains about one mile inland.

Sangbauen, 1,816 feet (553m5) high, the northern peak of the range mentioned above, lies about 1¼ miles south-eastward of Piedras point; when seen from south-westward, this peak has a small table summit, with two small nipples on the brow in front of it.

Bentoan peak, 1,715 feet (522m8) high, lies about 1¾ miles southward of Sangbauen, from which it is separated by a wooded valley which extends from the head of Watering bay (page 169); this peak has a sharp summit when seen from south-westward.

From Bentoan peak the range, with four distinct peaks, of which Tagnipa, 933 feet (284m4) high, is the greatest elevation, extends southward to the coast at Dalrymple point, situated 6½ cables south-south-eastward of Broken head.

Chart 967.

Mount Bloomfield, a table-topped mountain, 2,570 feet (783m3) high, on the summit of which there are several nipples, lies about 4 miles eastward of Piedras point, from which it is separated by a low wooded valley; the northern slopes of the mountain terminate in a bold barren headland, which forms the western entrance point of St. Paul bay described on page 171. *See* view on chart 2912.

Mount St. Paul, a prominent peak with a rounded summit, 3,370 feet (1,027m2) high, lies about 7 miles east-south-eastward of Piedras point; Cleopatra Needle, a sharp peak, 5,225 feet (1,592m6) high, the southern-most and highest peak of a range, named by the old navigators the Four Peaks, lies about 5½ miles east-south-eastward of Mount St. Paul, and is prominent. The northern extremity of Four Peaks range is abrupt; a high, round-topped hill lies between it and the coast westward, *see* view facing page 166.

Climate and weather.—*See* page 22.

Chart 2913.

Island and dangers.—Camungyan (Kamungyan), 150 feet (45m7)

Charts 2660b, 1263.

Digitized by Google

Chart 2913.

high, lies about 1¼ miles northward of North-west head. A rock, above water, lies on the southern end of a shoal about half a cable north-eastward of Camungyan island; near the northern end of this shoal, about half a cable northward, is a rock awash, which breaks at low water.

A ledge, with a least known depth of 6 fathoms (11m0) over it, sand and coral, but on which lesser depths may exist, extends southward from Camungyan island, nearly to North-west head.

Anchorage.—Watering bay, in which there is temporary anchorage in offshore winds, in depths of from 6 to 7 fathoms (11m0 to 12m8), is entered between Black rock, situated about 1½ miles southward of Piedras point, and Bentoan point, about one mile southward; vessels using this bay should anchor not less than one mile offshore, and should be prepared to weigh on the slightest indication of westerly winds.

Ulugan bay.—Islands.—Dangers.—North inlet, entered between Cordelia point, 1¼ miles south-south-eastward of North-west head, and Robins point, 4½ cables southward, has depths of only a few feet. South inlet, entered between the point situated three-quarters of a mile southward of Robins point and Sagumay point, about half a mile farther south-south-eastward, dries over the greater part.

Charts 2913, 967.

The eastern side of Ulugan bay, southward of Dalrymple point, is low and covered with mangroves, rising at about one mile inland to a range of hills, of which Harbour hill, 915 feet (278m9) high, is the greatest elevation. A prominent conical hill, 1,190 feet (362m7) high, lies about 2¾ miles south-south-eastward of Harbour hill.

Tagnipa inlet, the greater part of which dries, is entered between Dalrymple point (*Lat. 10° 07′ N., Long. 118° 49′ E.*) and Beehive point, about 1¼ miles south-eastward; Deans head, a wooded limestone cliff, lies near the head of the inlet.

Chart 2913.

The entrance to Tagnipa inlet is encumbered by a bank, with depths of less than 2 fathoms (3m7) over it, which extends nearly half a mile southward from Dalrymple point, and the same distance west-south-westward from Beehive point; several shoal patches, with depths of from 3 to 5 fathoms (5m5 to 9m1) over them, lie off this bank, within a distance of 11 cables westward and west-south-westward of the latter point.

Between Beehive point and Marabay point, about 2 miles south-south-westward, the coastal bank, with depths of less than 2 fathoms (3m7) over it, extends about 3½ cables offshore; a patch, with a least depth of 4 fathoms (7m3) over it, lies 9 cables north-north-westward of Marabay point.

Magsiapo reef, with a least depth of 1¼ fathoms (2m3) over it, extends about 4 cables northward and 5 cables westward from Reef islet, situated nearly 2 cables north-north-westward of Marabay point. A patch, with a depth of 4 fathoms (7m3) over it, lies about 3½ cables west-north-westward of this reef.

A shoal, with a least depth of 2½ fathoms (4m6) over it, coral, lies about 6½ cables westward of Marabay point; two patches, with depths of 1½ and 3½ fathoms (2m7 and 6m4) over them, respectively, lie between it and the shore bank east-south-eastward.

A reef, awash, on which the sea generally breaks at low water, lies

Digitized by Google

Chart 2913.

about 1¼ miles south-south-westward of Marabay point ; a coral patch, with a depth of 2½ fathoms (4m6) over it, lies about 1½ cables north-westward of the edge of this reef. The high nipple westward of Sangbauen (page 168), bearing more than 009°, and open westward of Broken head, leads westward of the dangers mentioned above.

Rita island lies on the western side of the bay, about 4 cables eastward of Sagumay point. A spit, with depths of less than 3 fathoms (5m5) over it, extends about 1¼ cables northward from the northern extremity of the island. Observatory rock, 45 feet (13m7) high, lies on this spit about half a cable from the point.

The eastern side of Rita island is steep-to, with depths of 20 fathoms (36m6) within one cable of the fringing reef. A reef, which dries, the edges of which are usually marked by discoloration, extends about one cable southward from Tidepole point, the southern extremity of the island.

The northern part of the channel between Rita island and the mainland westward is encumbered with coral shoals ; during strong northerly gales the sea appears to break right across this part of the channel.

In the southern part of the channel, southward of Sagumay point, there are depths in the fairway of from 10 to 19 fathoms (18m3 to 34m7).

Oyster inlet is entered between a point, situated about one mile southward of Sagumay point, and Coral point, about half a mile farther in the same direction. The shores of this inlet are fringed with coral reefs, which narrow the entrance channel to less than a quarter of a mile ; an oyster bed, consisting of mud and rocks, with depths of less than 3 fathoms (5m5) over it, extends about half a mile from the head of the inlet.

The depths in Oyster inlet decrease gradually from about 19 fathoms (34m7) in the entrance, to 9 fathoms (16m5) close to the edge of the oyster bed ; the bottom is stiff mud.

A group of detached coral rocks, with depths of less than 6 feet (1m8) over them, lie about 3½ cables eastward and south-eastward of Coral point.

A rock, with a depth of less than 6 feet (1m8) over it, lies about 1½ cables eastward of Malagan point, which lies about 4 cables south-south-eastward of Coral point.

Between Malagan point (*Lat. 10° 03′ N., Long. 118° 47′ E.*) and the mouth of Caiholo (Kaiholo) river, about 6 cables southward, a reef with depths of less than 3 fathoms (5m5) over it, extends about 3 cables offshore ; two shoals, with depths of 3 and 2 fathoms (5m5 and 3m7) over them, lie, respectively, about 5 cables south-eastward and 6½ cables south-south-eastward of Malagan point. Caiholo river, the entrance to which is obstructed by shoals, is navigable by boats for about half a mile above its mouth.

The head of Ulugan bay, southward of Caiholo river entrance, is encumbered by reefs and shoals ; Tarakaiawan islet lies near the northern edge of these reefs about half a mile south-eastward of the river entrance. White rock, which is prominent from inside the entrance to the bay, lies 4½ cables south-south-westward of Tarakaiawan islet.

Baheli river, which has an islet in its entrance, and is navigable

Charts 2660b, 1263.

Digitized by Google

Chart 2913.

by boats for about 1¼ miles, discharges into the head of Ulugan bay about 8½ cables south-south-eastward of Tarakaiawan islet.

Anchorage.—Directions.—There is anchorage, during the South-west monsoon, in a depth of about 20 fathoms (36m6), stiff mud, about a quarter of a mile southward of Rita island.

The swell caused by westerly gales reaches the head of the bay, and breaks heavily on the reefs, especially on the eastern shore. During one of these gales, in November, 1851, which veered to north-west, H.M.S. *Royalist*, while lying at the anchorage described above, was pitching forecastle under at times.

The best anchorage for moderate-sized vessels is in a depth of 15 fathoms (27m4), mud, in Oyster inlet, with the northern entrance point in line with Tidepole point, bearing about 071°, and Coral point, 132°; here the channel is about 3¼ cables wide.

Chart 967.

A vessel bound for Ulugan bay, or for any of the harbours on the western side of Palawan northward of it, should not approach the coast within a depth of 100 fathoms (182m9), southward of the parallel of Lat. 10° 07′ N.

A vessel approaching from southward should endeavour to be in a position about 35 miles 266° from Camungyan island (page 168) at daybreak; approaching from this position, the entrance to the bay can be identified at a considerable distance by Mount St. Paul, Cleopatra Needle (page 168), and Mount Peel (page 166).

The 6-fathom (11m0) coral patch, situated about 22 miles west-north-westward of Table point (page 167), and Duhme shoal (page 167) should be given a wide berth, and a good lookout kept for other dangers which may exist.

Approaching from northward, the entrance to Ulugan bay can be identified by the apparent valley between Mount Peel and the high land south-westward of Cleopatra Needle; the low land at the head of the bay being invisible until moderately close to Piedras point (*Lat. 10° 12′ N., Long. 118° 48′ E.*). The 6¼-fathom (11m4) patch, about 3½ miles northward of Piedras point, should be avoided.

Tidal streams.—No perceptible tidal stream has been observed in the bay; after heavy rains, or after westerly winds, there is a slight outdraught from the bay.

Charts 2912, 967.

COAST.—St. Paul bay.—Islets and dangers.—St. Paul bay is entered between Capoas point, the northern extremity of the headland (page 168), situated about 4 miles east-north-eastward of Piedras point, and Cliff head, a long wooded promontory, terminating in a steep cliff, 350 feet (106m7) high, about 6 miles north-eastward. The southern shore in the vicinity of Capoas point, is bold, but thence eastward and northward it is a series of sandy indentations and low rocky points. Paodat point lies about 1¼ miles southward of Cliff head, and a rock, 87 feet (26m5) high, lies about one cable northward of the point. St. Paul rock, 5 feet (1m5) high, lies about one mile south-south-westward of Paodat point; a small rock lies close westward of St. Paul rock. A 3½-fathom (6m4) patch lies about 1¼ miles southward of Paodat point.

Kinaulugan cove, between Cliff head and Paodat point, extends about 1½ miles eastward, and has depths of from 13 to 14 fathoms (23m8 to 25m6) in its entrance.

Charts 2660b, 1263.

Digitized by Google

Charts 2912, 967.

Anchorage in St. Paul bay is not recommended as there is no protection from north-westerly winds.

Chart 2912.

Jibboom bay.—Islands and dangers.—Jibboom bay is entered between Cliff head and Peaked point, about 4½ miles northward; a detached rock, about 100 feet (30^{m}5) high, lies close off the latter point.

A group of islands and rocks lie in the entrance to the bay; Bay island, the westernmost and largest of these, with a flat summit, 277 feet (84^{m}4) high, lies about 2½ miles northward of Cliff head. (*See* view on chart 2912.) The northern coasts of the islands are deeply undercut and have caves in the cliff faces; the southern coasts are partly accessible. A rocky ledge, with depths of from 5 to 9 fathoms (9^{m}1 to 16^{m}5) over it, extends about half a mile north-westward from Zoe islet, the easternmost of the group.

Long point, about 2½ miles east-north-eastward of Cliff head, rises at about 2½ miles inland, to an elevation of 2,173 feet (662^{m}4); on either side of this point is a sandy bay.

In the south-western bay, a spit, with a depth of 4 fathoms (7^{m}3) over it, and steep-to, extends 4 cables from the point situated about three-quarters of a mile east-south-eastward of the northern side of Cliff head. A rocky bank, with depths of from 2¾ to 4 fathoms (5^{m}0 to 7^{m}3) over it, extends out into the bay to a position about 9 cables south-south-westward of Long point. A 4¾-fathom (8^{m}7) patch lies 4 cables westward of Long point. In the north-eastern of these two bays there is a 2¼-fathom (4^{m}1) patch about one mile eastward of Long point. The sea breaks on these reefs during a heavy swell. A 3½-fathom (6^{m}4) patch lies about 9 cables westward of Chawat point, situated about 1½ miles north-eastward of Long point. A rocky reef, with depths of from 1½ to 3 fathoms (2^{m}7 to 5^{m}5) over it, extends 4 cables north-westward from Chawat point (*Lat. 10° 20′ N., Long. 118° 59′ E.*). Two shoals, with depths of 2½ and 2¼ fathoms (4^{m}6 and 4^{m}1) over them, lie about 4 cables west-north-westward and 6 cables northward, respectively, of Chawat point.

Square islet lies close to Square point, the inner entrance point of the bay, on the northern side, about 1½ miles south-south-eastward of Peaked point.

There is a small settlement at Caruray, situated in the bight on the northern side of Chawat point.

There are two bights in the north-eastern part of Jibboom bay, the inner parts of which are completely filled with mud, sand and rock.

A group of reefs, which partly dry, lie about 1½ cables offshore in the small bight close eastward of Square point.

Kaydoros is a small settlement on the western side of the bight about 1½ miles east-north-eastward of Square point.

Anchorage may be obtained, in a depth of 10 fathoms (18^{m}3), mud, well sheltered, in the entrance to the north-eastern bight, about 1½ miles eastward of Square point.

Coast.—Amalingat point, a steep bold headland, lies 2½ miles north-eastward of Peaked point. Ninepin rock lies close off Amalingat point, and a reef, awash, lies 1½ cables westward of the rock.

Catalat (Katalat) island, 829 feet (252^{m}7) high, with a clump of trees near its summit, lies 1¾ miles east-north-eastward of Amalingat point. It is joined to the mainland southward by a narrow ridge on which are

Digitized by Google

Chart 2912.

two pyramidal rocks ; two boat channels, with depths of 3 feet (0m9), available in fine weather, lead through the ridge into Mayday bay.

Mayday bay and approaches.—Dangers.—Mayday bay is entered between the northern extremity of Catalat island and Dalaga point, about 4¾ miles north-eastward. Cacbolo (Kakbolo) island, 496 feet (151m2) high, lies about 7 cables north-westward of Catalat island ; the northern and western sides of the island are bold steep cliffs, but on the eastern side there is a sandy bay. A reef, awash, lies close off the north-eastern extremity of the island.

A sunken rock, on which the sea breaks at all stages of the tide, lies about 3¼ cables north-eastward of the north-eastern extremity of Catalat island.

Cacnipa (Kaknipa) island, a steep bold island with two peaks, of which the southern is 1,130 feet (344m4) high, lies about half a mile north-westward of Dalaga point. (*See* view on chart 2912.) Passage reef, on which there are rocks, 5 feet (1m5) high, lies in mid-channel between them.

Peaked rock, 42 feet (12m8) high, lies about 3 cables north-north-westward of the northern extremity, and Thumb rock close off the south-western extremity of Cacnipa island.

Mayday bay is protected on its eastern side by a long irregular shaped promontory, a continuation of the Mayday range, which rises to an elevation of 1,105 feet (336m8) at Queens Bay peak, situated about 2¼ miles south-south-eastward of Dalaga point.

Watering bay, on the southern side of which a stream of fresh water falls from the rocks, lies in the south-western part of Mayday bay. Catalat (Katalat) peak, 1,525 feet (464m8) high, lies about half a mile south-westward of the head of Watering bay.

Conical head, about 2 miles eastward of Catalat island, divides the head of Mayday bay into two sandy coves, into the south-western of which flow some fresh water streams.

Anchorage.—There is good anchorage, in a depth of 19 fathoms (34m7), off the entrance to Watering bay, about one mile west-south-westward of Conical head. There is also good anchorage, except during north-westerly winds, in depths of from 10 to 15 fathoms (18m3 to 27m4), soft mud, in the southern part of the bay. Crocodiles have been seen near the head of the bay.

Approach to Port Barton and Pagdanan bay.—Islands and dangers.—The common approach to Port Barton and Pagdanan bay lies between Milner head (*Lat. 10° 31′ N., Long. 119° 05′ E.*), the north-eastern extremity of Cacnipa island, and Pagdanan point, the extremity of a reddish coloured peninsula of the mainland, 470 feet (143m3) high, about 9 miles east-north-eastward. Close southward of Pagdanan point there is an extensive landslide.

From Pagdanan point a spit, with depths of 3 fathoms (5m5) over it, extends about 4 cables north-westward ; Confusion rock, a white rock, 47 feet (14m3) high, lies near the outer end of this spit.

Boayan island, 946 feet (288m3) high, and densely wooded, lies in the approach to Port Barton and Pagdanan bay, dividing it into two channels ; Bluff point, the south-western extremity of the island, lies about 3¼ miles north-eastward of Milner head.

Bold head, the north-western extremity of Boayan island, situated about 2 miles northward of Bluff point, rises, at about a quarter of a

Digitized by Google

Chart 2912.

mile inland, to a double peak, 785 feet (239m3) high. Petulant point, the northern extremity of the island, rises to an elevation of 532 feet (162m2) about 3 cables south-westward. Broughton point, the eastern extremity, is rocky; some rocks, the highest of which has an elevation of 64 feet (19m5), lie close off the point and are connected to it at low water.

Good anchorage may be obtained in Village bay, on the western side of Boayan island, in northerly or easterly winds; there is also anchorage, in a depth of about 14 fathoms (25m6), sheltered from south-westerly winds, about three-quarters of a mile northward of Broughton point.

Lump island, 404 feet (123m1) high, lies about a quarter of a mile westward of Bluff point; there are two islets in the channel between them, one of which is 102 feet (31m1) high.

Saddle islet, 4½ cables south-south-westward of Bluff point, is 216 feet (65m8) high; a reef, awash, lies between this islet and the point, and some rocks, one of which is 80 feet (24m4) high, extend about 1½ cables from its eastern side. A rock, with a depth of less than 6 feet (1m8) over it, lies about one cable south-eastward of the 80-foot (24m4) rock.

Royalist shoal, with a least depth of 2½ fathoms (4m6) over it, coral, and steep-to, lies 9 cables south-eastward of Saddle islet.

Two small rocks, awash, lie, respectively, 7 cables south-eastward and 9 cables east-south-eastward of Wilson head, a narrow promontory on the southern side of Boayan island, about 1¼ miles eastward of Bluff point.

Boayan reef, awash, lies near the extremity of a spit, with depths of 3 feet (0m9) over it, which extends about half a mile southward from Hall point, situated about 1½ miles east-north-eastward of Wilson head. A 10-fathom (18m3) patch lies about 4½ cables south-eastward of Boayan reef.

Pagdanan rock (*Lat. 10° 34′ N., Long. 119° 13′ E.*), with a least depth of one fathom (1m8) over it, coral, lies near the middle of the north-eastern approach, about one mile north-north-westward of Pagdanan point.

Niaporay (Niaporai) island, 380 feet (115m8) high, lies about 6 cables southward of Broughton point, and is connected to it by a bank, with depths of from 4 to 7 fathoms (7m3 to 12m8) over it; a rock, which dries, lies on this bank about one cable northward of the island. A spit, with a least depth of one fathom (1m8) over it, extends about 3 cables south-south-westward from the island. A rock, with a depth of less than 6 feet (1m8) over it, lies about one cable, and a rock, awash, nearly 3 cables, off the north-eastern side of Niaporay island.

Niaporay (Niaporai) rock, with a least depth of 2 fathoms (3m7) over it, lies about one mile westward of Pagdanan point; a one-fathom (1m8) patch lies about midway between them, and a 4-fathom (7m3) patch lies 2½ cables west-north-westward of Confusion rock.

Port Barton.—Islands and dangers.—Port Barton, entered between Bubon point, situated about 2¼ miles eastward of Dalaga point (page 173), and Riddle point, the south-western extremity of Albaguen island, about 1¼ miles north-north-eastward, affords shelter at all times.

Albaguen island is 631 feet (192m3) high, with a prominent red stripe on its north-western side; Isthmus cone, a nearly detached cone-

Digitized by Google

Chart 2912.

shaped headland, 261 feet (79m5) high, is connected to the north-western side of the island by a small isthmus.

A rocky spit, with a depth of 4½ fathoms (8m2) over it, extends about 4¼ cables northward from the northern side of Albaguen island, about three-quarters of a mile eastward of Isthmus cone. A rocky shoal, with a depth of one fathom (1m8) over it, and steep-to, lies half a mile northward of the south-eastern extremity of the island and about 2¼ cables offshore.

Between Albaguen island and Caramatan (Karamatan) point, on the mainland, about 3¼ miles south-eastward, there are several islands, which together form the north-eastern side of the harbour; Capsalay (Kapsalai) island, the inner island of the group, is joined to Caramatan point by a reef, which almost dries, and which extends about a quarter of a mile north-eastward from the southern part of the island.

A shoal, with a depth of 1½ feet (0m4) over it, lies about one cable westward of the southern extremity of Capsalay island.

Other islands of this group from north to south are Savage, Cone, Dean, Bush and Morison islands; a rock, with a depth of less than 6 feet (1m8) over it, lies about 3 cables south-eastward of Cone island.

Regatta island lies with its south-eastern extremity about half a mile westward of Capsalay island, to which it is connected by a reef; Double island lies on this reef about midway between them. Shoals lie about a quarter of a mile off the northern end of Regatta island, and extend the same distance southward from Double island. Between Regatta and Double island there is an island, between which and Regatta island there is a channel, with depths of about 4 feet (1m2).

Queens bay lies in the western part of the port and is entered between Bubon point (*Lat. 10° 29′ N., Long. 119° 07′ E.*) and Oyster point, about 1¾ miles southward. The shores are fringed with coral reefs which extend from about one to 2 cables offshore. A steep-to coral reef extends about 2¼ cables northward from Oyster point.

Capsalay (Kapsalai) reef, a coral reef, almost awash, lies about half a mile southward of the south-western extremity of Double island.

Middle reef, awash, lies about 1¼ miles south-eastward of Oyster point; a group of three rocks, awash, lies about 8 cables west-south-westward of Middle reef.

Endeavour island lies near the head of the harbour, with its southern extremity about one mile eastward of Calver point, situated about 2¾ miles southward of Oyster point; Wedge islet lies about midway between this island and the mainland half a mile south-eastward.

Between Endeavour island and Capsalay island there are several reefs and shoals, the positions of which can best be seen on the chart.

Anchorage.—Vessels sheltering in Port Barton during the South-west monsoon should anchor, in a depth of about 20 fathoms (36m6), stiff mud, in the entrance to Queens bay, about half a mile southward of Bubon point.

There is good anchorage, sheltered from north-east winds, in a depth of about 12 fathoms (21m9), mud, about three-quarters of a mile westward of the southern extremity of Capsalay island. Vessels approaching this anchorage should take care to avoid Capsalay reef.

Coast.—Dangers.—A reef, with depths of less than 6 feet (1m8) over it, extends about 8 cables north-north-eastward from Caramatan point, and a 3½-fathom (6m4) patch lies about half a mile eastward of its

Digitized by Google

Chart 2912.

northern extremity. Betbet islet, from which a coral reef extends about 6 cables west-north-westward, lies about one cable north-westward of Betbet point, situated about 2¼ miles north-eastward of Caramatan point. Betbet point rises at about a quarter of a mile inland to a conical hill. A reef extends about 3½ cables northward from Reef point, situated about three-quarters of a mile north-eastward of Betbet point.

Pagdanan bay.—Dangers.—Pagdanan bay, which affords shelter in north-easterly winds, is entered between Reef point and Pagdanan point (page 173); a heavy swell is experienced during westerly and south-westerly winds. About 4 miles eastward of the head of the bay Pagdanan range rises to an elevation of about 2,000 feet (609m6).

The northern shore of Pagdanan bay is fringed with reefs which extend in places nearly one mile offshore. Double island, 158 feet (48m1) high, lies near the western end of these reefs about three-quarters of a mile southward of Pagdanan point; it is almost connected to the shore at low water. A detached rock, with a least depth of 2 fathoms (3m7) over it, lies about three-quarters of a mile south-westward of Double island.

Several rivulets discharge into the head of Pagdanan bay close southward of Squall point (*Lat. 10° 29′ N., Long. 119° 14′ E.*), situated about one mile eastward of Reef point, and also southward of Green head, about 1½ miles north-eastward of Squall point.

Anchorage.—Directions.—During south-westerly winds there is good anchorage northward of Capsalay island, and, in a depth of about 10 fathoms (18m3), in north-easterly winds in Pagdanan bay. Vessels approaching either of these anchorages should not bring the southern peak of Saddle islet (page 174) to bear less than 315°, until the summit of Catalat island (page 172), seen between Dalaga point and the southern extremity of Cacnipa island, bears 231°, in order to clear Royalist shoal.

Charts 2911, 2912.

Imuruan bay.—Islands and dangers.—Imuruan bay is entered between Pagdanan point and Emergency point, about 13 miles north-north-eastward.

Wedge island, 222 feet (67m7) high, wedge shaped and thickly wooded, lies in the entrance to the bay, about 4¾ miles west-south-westward of Emergency point; a bank, with depths of less than 5 fathoms (9m1) over it, extends about one cable southward and eastward from the island.

Chart 2912.

A range of hills extends parallel with the shore of Imuruan bay about 2 miles inland; Bay peak, 2,018 feet (615m1) high, situated about 11½ miles north-eastward of Pagdanan point, is the highest and most prominent peak.

For about 8½ miles north-eastward from the low neck of Pagdanan peninsula the shore of the bay consists of sandy beaches, separated by small rocky headlands. Islet head, the southernmost of these headlands, close off which there is a small islet, 57 feet (17m4) high, lies about 5 miles east-north-eastward of Pagdanan head; an islet, 52 feet (15m8) high, lies close off a headland about 1¼ miles farther in the same direction.

A shoal, with a depth of 1¼ fathoms (2m3), over it, which breaks, lies

Digitized by Google

Chart 2912.

about 2¼ miles east-north-eastward of Bullock point, situated about 8 cables eastward of Pagdanan point.

Several shoals, with depths of 6½ and 7 fathoms (11m9 and 12m8) over them, lie about 4 miles northward of Islet head, and about 2 miles offshore.

Charts 2911, 2912.

From the northern end of the sandy beach mentioned above, the coast is bold and rocky for 2½ miles, thence there is a sandy beach for 3 miles, and thence to Emergency point it is rocky. Throughout the bay there are depths of from 3 to 5 fathoms (5m5 to 9m1) close to the beaches.

Chart 2912.

Imuruan island, 519 feet (158m2) high, the larger of the two Bay islands, lies about 1½ miles offshore, and 4¼ miles south-south-eastward of Emergency point; a reef extends about 6 cables eastward from the island, between which and the coastal reef there is a channel, about 7 cables wide, with depths of from 4 to 7 fathoms (7m3 to 12m8).

A 4-fathom (7m3) shoal lies about 4 cables south-westward, and a 5½-fathom (10m1) shoal the same distance south-eastward of the southern extremity of Imuruan island.

Lampinigan island, the smaller island, 282 feet (85m9) high, lies about 2 cables westward of Imuruan island.

Charts 2911, 2912.

A shoal, with a depth of 3¾ fathoms (6m9) over it, coral, lies about one mile offshore and about the same distance southward of Binga point, situated about 3¼ miles east-south-eastward of Emergency point.

A group of rocks, 127 feet (38m7) high, from which a reef, which dries, extends 3 cables northward, lies about 1¼ miles eastward of Emergency point (*Lat. 10° 46′ N., Long. 119° 16′ E.*); near the northern extremity of the reef there is a rock one foot (0m3) high.

Anchorage.—There is anchorage, sheltered from north-easterly winds, in depths of from 7 to 10 fathoms (12m8 to 18m3), mud, in the northern part of the bay, about 2 miles eastward of Emergency point.

Coast.—Aspect.—Mount Capoas (Kapoas), 3,345 feet (1,019m6) high, with High Nipple and Low Nipple on its western shoulder, and a considerable landslip on its western face, lies about 2½ miles north-north-eastward of Emergency point; when seen from southward it appears to be table topped with steep sides (*see* view on chart 2912). There is a prominent waterfall on the northern face of the mountain.

Chart 2911.

Low Capoas (Kapoas), 1,563 feet (476m4) high, lies about 1½ miles northward of Mount Capoas; thence the range extends northward for about 7 miles and forms the summit of an extensive peninsula which protects Malampaya sound (page 179) from westward. Near the northern end of the range is Chinongab peak, with a sharp ridge, which rises to an elevation of 1,222 feet (372m5), and is prominent.

Saddle hill, 1,038 feet (316m4) high, and prominent, rises from the northern shore of Inlulutoc bay (page 178), and lies about 2 miles west-south-westward of Chinongab peak.

Diente hill, 711 feet (216m7) high, and Bolalo hill, a double peak, 886 feet (270m0), lie, respectively, about 1¾ miles north-north-westward, and the same distance northward of Saddle hill.

The coast between Emergency point and Cotteral point, about

Charts 3820, 967, 2660b, 1263.

Digitized by Google

Chart 2911.

3 miles northward, is steep-to with no off-lying dangers. A bay, entered between Cotteral point and Grave point, about 1½ miles north-westward, affords shelter from north-easterly winds. Near the head of this bay, about one mile eastward of Grave point, there is a rocky cliff, from which a reef, awash, extends about half a mile south-westward, and terminates in a coral head, on which there is a depth of 2 feet (0m6), and steep-to. On either side of the cliff there is a sandy beach.

White island, a steep conical island, 390 feet (118m9) high, connected to the coast at low water, lies close westward of Grave point; White Conical head, its southern extremity, is a small conical headland of whitish colour. An islet, 58 feet (17m7) high, lies on a reef which extends about 3 cables westward from White island, and a rock, 12 feet (3m7) high, lies about 1½ cables farther in the same direction.

Between Grave point and Enterprise point, about 2¼ miles north-westward, the coast is indented by three bays. Fowlers head, which separates the two north-westernmost bays, is 387 feet (118m0) high.

Cape Capoas (Kapoas) (*Lat. 10° 52′ N., Long. 119° 12′ E.*) is a bold projecting headland, with two peaks, the northern of which rises to an elevation of 861 feet (262m4), about 4 cables east-south-eastward.

Between Cape Capoas and Inlulutoc (Inlulutok) head, about 1½ miles north-eastward, is the entrance to a bay, the inner part of which is encumbered with reefs and shoals. Alligator rock, 4 feet (1m2) high, and Bullocks rock, 15 feet (4m6) high, lie in the southern part of the bay and are situated, respectively, about three-quarters of a mile and 1¼ miles eastward of Cape Capoas. A 4¾-fathom (8m7) patch lies close eastward of Alligator rock.

Inlulutoc bay. — Inlulutoc (Inlulutok) bay, entered between Inlulutoc head and Wreck head, a bold rocky cliff about 1¾ miles north-north-westward, affords good shelter during the North-east monsoon; the entrance can be identified by Saddle hill (page 177), and Chinongab peak which rise northward and north-eastward, respectively, of it.

The shores of Inlulutoc bay are largely fringed with coral reefs, the edges of which are usually visible; Anchorage islet, 92 feet (28m0) high, lies on the reef near the head of the bay, about 1¾ miles eastward of Wreck head.

A spit, with depths of 5 fathoms (9m1) over it, extends about 3 cables northward from the southern shore of the bay; a rock, awash, lies on this spit about one mile east-north-eastward of Inlulutoc head.

Anchorage.—There is a good anchorage with offshore winds, in depths of about 15 or 16 fathoms (27m4 or 29m3), mud, in the entrance to the cove between Anchorage islet and Teodore point, about half a mile west-north-westward.

Black head lies 8½ cables north-north-eastward of Wreck head. A bay, entered between Black head and Cape Ross, about 1½ miles north-north-westward, is open south-westward. Bay rock, above water, with a depth of 6½ fathoms (11m9) within half a cable westward, lies near the head of the bay, 8½ cables south-eastward of Cape Ross.

From Cape Ross the land rises steeply to Diente hill, 6½ cables north-eastward. Diente point, about one mile north-north-eastward of Cape Ross, is fringed by a narrow steep-to coral reef.

Chart 967.

OUTLYING DANGERS. — Caution. — Crescent reef, about

Digitized by Google

Chart 967.

23 miles north-westward of Amalingat point (page 172), is a narrow strip of coral, three-quarters of a mile long, with a least depth of 4 fathoms (7m3) over it; there are depths of from 40 to 44 fathoms (73m2 to 80m5) within half a mile of the reef.

The following shoals lie in the vicinity of Crescent reef:—Two shoals, with depths of 7 and 6 fathoms (12m8 and 11m0) over them, and steep-to, about 2½ miles southward; several shoals, with depths of 3 and 4 fathoms (5m5 and 7m3) over them, from 5½ to 7 miles southward. Two 3¾-fathom (6m9) patches, about 5½ and 7 miles southeastward. A group of shoals, with depths of from 2¾ to 4¾ fathoms (5m0 to 8m7) over them, about 7½ miles south-eastward.

Two shoals, with depths of 3 and 4½ fathoms (5m5 and 8m2) over them, about 5¾ and 6¾ miles eastward; a 5-fathom (9m1) patch, 5 miles farther eastward; a 4½-fathom (8m2) patch, about 3 miles east-north-eastward; a shoal, with a least depth of 4¾ fathoms (8m7) over it, about 4½ miles farther east-north-eastward. Two 5-fathom (9m1) patches, about 14 miles east-north-eastward and 17½ miles north-eastward, respectively, of the reef.

Kapoas cluster, a group of coral shoals, with depths of from 3¾ to 9 fathoms (6m9 to 16m5) over them, lies from about 5 to 19 miles north-north-eastward of Crescent reef (*Lat. 10° 40′ N., Long. 118° 42′ E.*). Several shoals, with depths of from 3 to 6 fathoms (5m5 to 11m0) over them, lie within 5 miles eastward of the line joining Crescent reef and the south-eastern edge of Kapoas cluster.

Crater shoal, horse-shoe shaped, with depths of from 4¾ to 10 fathoms (8m7 to 18m3) over it, and with deep water in the middle, lies with its eastern extremity, about 21 miles westward of Cape Ross (page 178); several patches, with depths of from 3½ to 6 fathoms (6m4 to 11m0) over them, lie within 5 miles eastward and south-eastward of Crater shoal.

A shoal, with a depth of 5 fathoms (9m1) over it, was reported, in 1949, to lie about 15 miles west-north-westward of Cape Ross.

There are numerous shoals, with depths of from 3 to 9 fathoms (5m5 to 16m5) over them, between a position about 9 miles north-north-westward of Duhme shoal (page 167) and Crescent reef, and also between the above mentioned position and a position about 25 miles northward; their positions can best be seen on the chart. Vessels should avoid this area.

Charts 3807, 967.

Detached shoals, with depths of from 4¾ to 10 fathoms (8m7 to 18m3) over them, extend about 35 miles north-eastward from the northern end of Crater shoal; the shoalest patch lies about 23 miles westward of Libro point (page 195). These shoals are mostly steep-to and are flat-topped.

Chart 2911.

MALAMPAYA SOUND AND APPROACHES.—Malampaya sound, entered between Diente point and Signal head, about 7½ miles north-eastward, is one of the finest natural harbours in the Philippine islands, and is capable of affording safe anchorage to a large number of vessels of all sizes.

The shores of the sound are generally steep and densely wooded, rising abruptly from a beach, intersected by many bold headlands,

Charts 3820, 967, 2660b, 1263.

Digitized by Google

Chart 2911.

rocky points and small areas of mangrove swamp; at the head of the inner sound there is a large tropical swamp.

The country in the vicinity of Malampaya sound is sparsely inhabited; the principal products are lumber and forest products, and there are a few cattle.

Tuluran island, rugged and densely wooded, lies on the eastern side of the entrance to Malampaya sound, with Peaked point, its northwestern extremity, 5 miles north-north-eastward of Diente point. Two sharp peaks, North Tuluran, 1,331 feet (405m6) high, and South Tuluran, 1,311 feet (399m6) high, lie near the middle of the island, and Thumb peak, with a table top, 1,066 feet (324m9) high, lies about three-quarters of a mile north-north-westward of Pillar point, the southern extremity of the island.

Worcester strait.—Dangers.—Worcester strait, the main entrance to Malampaya sound, is deep in the fairway and has a least width of 6 cables; it is approached from seaward between Diente point and Peaked island, 270 feet (82m3) high, and wooded, situated about one cable north-westward of Peaked point. Two rocks, awash at high water, lie on the edge of the reef which extends one cable north-westward from Peaked island. The channel between the island and the shore reef is narrow, with a depth of about 2 fathoms (3m7).

From Triple head (*Lat. 11° 01′ N., Long. 119° 16′ E.*), situated 3½ cables south-westward of Peaked point, to Tuluran point, about one mile southward, the western side of Tuluran island is bold and precipitous, with several prominent water courses. Between Tuluran point and a point about 6 cables southward, the coast forms a bay, with a sandy beach from which the land rises gradually; thence to Bold head, the western extremity of the island, about half a mile south-south-westward, it is again bold and precipitous.

Pyramid rocks, a group of rocks, the highest of which has an elevation of 42 feet (12m7), lie 9 cables westward of Triple head; a detached coral rock, with a least depth of about 4 feet (1m2) over it, lies about 3 cables north-eastward of the highest rock, and a reef, which dries, lies between them.

White Round islet, 71 feet (21m6) high, and steep-to, lies about 1¼ miles west-north-westward of Bold head; it is a useful landmark to vessels approaching the strait from north-westward.

Diente shoal, with a least depth of 2¾ fathoms (5m0) over it, coral, lies 9 cables north-north-westward of Diente point; the channel between them is deep and clear of dangers.

Notch island, 188 feet (57m3) high, and wooded, lies on a reef, which dries extending about 2 cables northward from the point, situated about half a mile east-north-eastward of Diente point. A group of rocks, 15 feet (4m6) high, lies about 1¼ cables northward of the island.

Pillar rock, 35 feet (10m7) high, and Entrance rock, 13 feet (4m0) high, lie, respectively, on the southern and eastern edges of a steep-to reef, situated about 6 cables north-north-eastward of Notch island.

Between Notch island and a point about 6½ cables south-eastward, the coast forms a bay the shores of which are fringed by coral reefs.

Largon islet, 128 feet (39m0) high, and wooded, lies near the southern end of an extensive reef, on which there are a number of islets and rocks, situated about one mile eastward of Notch island; Largon

Digitized by Google

Chart 2911.

rock, 13 feet (4m0) high, lies about one cable north-eastward of the northern extremity of the reef.

Cone islet, 243 feet (74m1) high, and wooded, lies about a quarter of a mile southward of Largon islet, from which it is separated by a channel with depths of 7 fathoms (12m8).

Bolalo bay, entered between the point situated about 6½ cables south-eastward of Notch island, and Parmidiaran point, about 1¾ miles eastward, is clear of dangers and deep in the fairway. During stormy weather it is subject to strong gusts of wind from the surrounding hills. For Bolalo hill, on the western side of the entrance, *see* page 177.

The shores of the bay consist principally of coral and mangroves, and near its head, a coral reef extends 4 cables offshore. The head of the bay is separated from Inlulutoc bay (page 178) by a high, narrow isthmus.

Vessels can anchor, in depths of from 16 to 18 fathoms (29m3 to 32m9), mud, anywhere within the entrance points.

Bolalo bay may be approached either eastward or westward of Largon and Cone islands, giving the former a good berth to avoid the reefs extending from it.

From Bold head the bold western coast of Tuluran island trends south-south-eastward for about 1½ miles to Chinayan head, and thence east-south-eastward for about the same distance to Pillar point.

Lookout point, the southern entrance point of Worcester strait from eastward, lies about 1½ miles south-eastward of Parmidiaran point (*Lat. 10° 57′ N., Long. 119° 16′ E.*). White rock, which dries, close northward of which is a rock awash, lies nearly in the middle of the entrance to the bight between these two points.

Endeavour strait and approaches. — Dangers. — The approach to Endeavour strait from northward lies between Peaked point and Signal head. The strait has a least depth in the fairway of 4¾ fathoms (8m7), and is about half a cable wide in the narrowest part, situated close southward of Chase head, on the mainland about 1¾ miles south-westward of Signal head. The shores of the strait consist of mangroves and are fringed with coral reefs.

North bay, the shores of which are sandy and gradually sloping, lies between the point about 6½ cables east-south-eastward of Peaked point and Conical head, about 6 cables north-eastward.

From the western entrance point of the strait, situated about one mile south-eastward of Conical head, a bank, with depths of less than 10 fathoms (18m3) over it, extends about 2¼ miles northward. Saddle island, at the northern end of the bank, has two rounded hills, the southern of which is 298 feet (90m8) high, and is very prominent; it is fringed by reefs, above and below water, which extend about 1½ cables north-westward and 2 cables eastward from its northern end.

Camago (Kamago) island, 184 feet (56m1) high, and wooded, lies on the reef which extends about half a mile southward from the southern end of Saddle island; a detached rock, which dries, lies about one cable southward of the extremity of the reef.

Needle rocks, some of which are above water, lie about 4 cables southward of the detached rock, which dries, southward of Camago island, with depths of from 5 to 7 fathoms (9m1 to 12m8) between. Anato island, 194 feet (59m1) high, and fringed with reefs, lies about 2 cables northward of the north-eastern extremity of Tuluran island,

Digitized by Google

Chart 2911.

from which it is separated by a narrow channel, with a depth of $3\frac{3}{4}$ fathoms (6^m9).

Between Relinquish head, about $1\frac{1}{2}$ miles southward of the western entrance point of Endeavour strait, and Exertion point, $1\frac{1}{4}$ miles farther southward, there is a bay, near the middle of which, just inside the line joining the two points, there is a group of rocks, which dry.

Pirates Hold is a sheltered cove, entered between Bando point, about $3\frac{1}{2}$ miles southward of Chase head, and Endeavour point, about half a mile farther southward. There are depths of from 10 to 15 fathoms (18^m3 to 27^m4) in the outer part; a $1\frac{1}{4}$-fathom (2^m3) patch lies about $1\frac{1}{4}$ cables northward of Endeavour point, and a $1\frac{3}{4}$-fathom (3^m2) patch lies on the northern side of the cove about $2\frac{1}{4}$ cables south-eastward of Bando point.

Outer part of Malampaya sound.—Dangers.—Pirate bay, the northernmost bay on the south-western side of the sound, is entered between Lookout point (page 181) and Slip point, the northern extremity of Tenabian island, about three-quarters of a mile south-eastward; it affords good anchorage, in depths of about 14 fathoms (25^m6), mud. Tenabian island (*Lat. 10° 55′ N., Long. 119° 17′ E.*), 350 feet (106^m7) high near its northern end, is separated from the mainland by Tenabian passage, a narrow channel, with a least depth of 6 fathoms (11^m0) in the fairway, but it is partially obstructed by a reef, which dries, extending from the western extremity of Tenabian island. A reef, with a depth of about 4 feet (1^m2) over it, extends about 2 cables north-westward from Slip point. Double rock, 15 feet (4^m6) high, lies in the approach to the southern entrance to Tenabian passage, about $3\frac{1}{2}$ cables south-westward of White point, the eastern extremity of Tenabian island.

North-east bay.—Dangers.—North-east bay is entered between Endeavour point and Calabuctung (Kalabuktung) point, about $3\frac{1}{2}$ miles south-south-eastward. Malapina island, 155 feet (47^m2) high, and fringed by a reef, lies one mile south-south-eastward of Endeavour point. Two shoals, with depths of $6\frac{3}{4}$ and $6\frac{1}{4}$ fathoms (12^m3 and 11^m4) over them, lie about 9 and 5 cables, respectively, south-eastward of Malapina island.

Boat rock, with a depth of about one foot (0^m3) over it, lies near the middle of a shoal, about $1\frac{1}{4}$ miles eastward of Malapina island; rocks, which dry, lie near the northern and southern extremities of the shoal.

North-east bay is much encumbered by islands and shoals, separated from each other by deep navigable channels. North-east Bay island, the largest island, about $1\frac{1}{4}$ miles east-north-eastward of Malapina island, is 367 feet (111^m9) high; about $1\frac{1}{4}$ cables eastward of North-east Bay island is Crane island, 177 feet (53^m9) high, with a depth of about 4 feet (1^m2) between them. Wilson islet, 115 feet (35^m0) high, lies about $2\frac{1}{2}$ cables north-north-eastward of Crane island, and is connected to it by a ridge, with a depth of about one foot (0^m3) over it. Janet islet, 179 feet (54^m6) high, lies $3\frac{3}{4}$ cables east-south-eastward of Wilson islet. Kalabangil island, 279 feet (85^m0) high, with a prominent solitary tree on it, lies 6 cables south-eastward of North-east Bay island. Binaluan village, in which there is a sawmill, is situated on the south-eastern shore of the bay south-eastward of Kalabangil island.

North-east bay is not recommended as an anchorage for deep-draught vessels, on account of the swell which sometimes sets into it

Digitized by Google

Chart 2911.

from Worcester strait, but there is good sheltered anchorage for small craft.

Taitai bay.—Taitai bay, on the western side of the sound, is separated from Tenabian passage by a promontory of the mainland, 570 feet (173^{m}7) high. Halfway islet, 108 feet (32^{m}9) high and wooded, lies close eastward of the promontory, and Taitai islet, 156 feet (47^{m}5) high and wooded, about 2 cables southward of Halfway islet. The bay is entered between Taitai islet and Bullock head, three-quarters of a mile southward, and affords anchorage, in depths of from 10 to 11 fathoms (18^{m}3 to 20^{m}1), mud.

Danger.—Huron rock, with a depth of 2¾ fathoms (5^{m}0) over it, coral, lies in the fairway to the inner sound, about 7 cables northeastward of Bullock head.

Turung bay.—Dangers.—Turung bay, which affords protected anchorage for several vessels, in depths of from 6 to 8 fathoms (11^{m}0 to 14^{m}6), mud, is entered between Bullock head (*Lat. 10° 54′ N., Long. 119° 18′ E.*) and Pugguiauan point, about one mile south-south-eastward; a spit, with depths of less than 5 fathoms (9^{m}1) over it, extends about 2 cables north-north-eastward from Pugguiauan point.

Turung islet, 98 feet (29^{m}9) high to the tops of the trees, lies near the northern side of the entrance to Turung bay, about a quarter of a mile southward of Bullock head; the island is surrounded by shoals, and a rock, which dries, lies about half a cable north-westward of its northern end. A detached shoal, with a least depth of 2¾ fathoms (5^{m}0) over it, lies about 2 cables east-north-eastward of the northern extremity of this island.

Cooke island, with Flat rock, which dries, close north-westward of it, and Fleming island lie near the southern shore of the bay, and about half a mile and one mile west-south-westward, respectively, of Pugguiauan point; both these islands are covered with trees about 100 feet (30^{m}5) high.

Calabuctung (Kalabuktung) islets, the eastern of which is 116 feet (35^{m}4) high, lie in the entrance to Passage Island bay, about a quarter of a mile, and 6½ cables, respectively, westward of Calabuctung point.

Inner strait.—The inner strait, separating Malampaya outer and inner sounds, is nearly 2 miles wide between Pugguiauan and Calabuctung points; it is encumbered by islands and shoals, between which there are several navigable channels.

Tacbolo (Takbolo) island, 297 feet (90^{m}5) high, and densely wooded, except where it has been cleared on the north-eastern slopes, lies in the middle of the northern end of the strait; Wedge head, its northern extremity, lies about one mile north-eastward of Pugguiauan point.

Passage island, the largest of the group, is 470 feet (143^{m}3), and is thickly wooded; its north-western extremity lies about one cable south-eastward of the south-eastern end of Tacbolo island, from which it is separated by Tacbolo (Takbolo) passage, with depths of 4¾ fathoms (8^{m}7) in the fairway. There is a narrow channel, available for boats between the island and Tuluan Cut Off, on the mainland, about one cable eastward.

Passage Island bay, entered between Wedge head and Calabuctung point, affords good shelter for several vessels; the best anchorage is, in depths of from 7½ to 9 fathoms (13^{m}7 to 16^{m}5), mud, near the middle of the western part of the bay.

Charts 3820, 967, 2660b, 1263.

Digitized by Google

Chart 2911.

Boswell islet, 112 feet (34m1) high, and wooded, lies near the northern shore of Passage Island bay, about 3 cables eastward of Calabuctung point. A coral shoal, with a least depth of 3½ fathoms (6m4) over it, lies in the southern part of the bay about 2 cables northward of Cliff point, the north-eastern extremity of Passage island.

Flat rock, above water, lies near the outer end of a spit, with a depth of 1½ fathoms (2m7) over it, which extends 2¼ cables westward from the western extremity of Passage island. Eniaran islet lies between Flat rock and the point. A 2½-fathom (4m6) patch lies about 1½ cables southward of Flat rock.

Palcocotan (Palkokotan) islet, 161 feet (49m1) high, and wooded, lies about 2 cables eastward of Green head, situated on the western side of the strait about 4½ cables south-south-eastward of Pugguiauan point; there is a depth of 13 fathoms (23m8) in the channel between them.

Alligator bay. — Dangers. — Anchorage. — Alligator bay, a well protected bay large enough to accommodate several large vessels, is entered between Green head and Balulu point (*Lat. 10° 51′ N., Long. 119° 19′ E.*), about 1½ miles south-south-eastward.

A coral shoal, with a least depth of 2¼ fathoms (4m1) over it, lies in the northern part of Alligator bay, about 2¼ cables south-south-eastward of Johnstone point, which lies about half a mile south-westward of Green head.

Millman islet, 39 feet (11m9) high, lies about a quarter of a mile north-north-eastward of Linackauan point, situated 8½ cables south-westward of Johnstone point. Foul ground extends from the islet almost to the mainland south-westward.

Alligator island, a wooded island, 310 feet (94m5) high, lies in the southern part of the bay; Iguano head, its south-eastern extremity, lies 6½ cables west-south-westward of Balulu point. White rock, a prominent light coloured rock, 4 feet (1m2) high, lies about one cable eastward of the north-eastern extremity, and a coral rock, which dries, lies the same distance north-westward of the northern extremity of the island.

Bay rock, 2 feet (0m6) high, lies about 3 cables west-south-westward of Golgotha head, the western point of the island; a shoal, with a depth of 1¼ fathoms (2m3) over it, coral, lies about a quarter of a mile south-eastward of Bay rock.

Dapay (Dapai) river discharges into Alligator bay, about 3 cables westward of Bay rock; this river can be entered by boats between half-tide and high water.

Double Cone islet, a wooded islet with two summits, about 100 feet (30m5) high, lies in the south-eastern part of Alligator bay, about a quarter of a mile eastward of Iguano head.

The best anchorage in Alligator bay is, in depths of about 8 or 9 fathoms (14m6 or 16m5), mud, midway between Johnstone point and Alligator island.

North-western approach to Inner sound. — Dangers. — Durangan island, 375 feet (114m3) high, and densely wooded, lies about half a mile north-north-eastward of Balulu point; a shoal, with a least depth of about one foot (0m3) over it, lies close westward of the island.

Calonhogon (Kalonhogon) islet, 70 feet (21m3) high, lies in mid-channel between Durangan island and Balulu point, about 3½ cables

Digitized by Google

Chart 2911.

north-eastward of the latter; the islet lies on a shoal, which extends about one cable northward from it.

Cansea (Kansea) rock, which dries, lies about one cable west-south-westward of the point situated half a mile westward of Canica (Kanika) point, the southern extremity of Passage island. Balolo rock, above water, lies on a spit, which extends about 1½ cables southward from the same point, and about one cable from the point. A 4¾-fathom (8m7) patch lies about 1½ cables south-eastward of Canica point.

Passage point lies on the mainland about three-quarters of a mile north-north-eastward of Canica point; between them is the southern entrance to the boat channel leading to Passage Island bay.

Balauan point, the north-eastern entrance point of the inner sound, lies about 1½ miles south-eastward of Passage point; Canipo (Kanipo) island, 260 feet (79m2) high and wooded, lies about one cable offshore midway between them.

Ibelbel island, 182 feet (55m5) high, wooded and steep-to, lies about three-quarters of a mile eastward of Canica point. Vinalo islet, 190 feet (57m9) high and wooded, and Mallarois islet, 42 feet (12m8) high, on which there are a few trees, lie, respectively, about 2 cables westward, and 4 cables south-westward of Balauan point (*Lat. 10° 52′ N., Long. 119° 22′ E.*). Foul ground extends about 1½ cables eastward from Mallarois islet, and a detached shoal, with a depth of 3 feet (0m9) over it, and steep-to, lies about 2 cables east-south-eastward of the same islet.

Bartoc (Bartok) islet, 29 feet (8m8) high, situated about three-quarters of a mile eastward of Balulu point, lies on a shoal, with depths of less than 3 fathoms (5m5) over it; a reef, which dries, lies on the shoal, about half a cable westward of the islet. Malaoton island, 280 feet (85m3) high, and wooded, lies about 6 cables eastward of Bartoc islet. Gull rock, 9 feet (2m7) high, lies near the outer end of a spit, with depths of 2 fathoms (3m7) over it, which extends about 1½ cables westward from the south-western extremity of Malaoton island. A rock, which dries, lies on the bank extending about half a cable from the western side of the island, about 1½ cables from the southern extremity.

Malipu bay. — Dangers. — Anchorage. — Malipu bay, separated from Alligator bay by a narrow ridge of hills, is entered between Balulu point and the north-western extremity of Damao island, about 2 miles east-south-eastward.

Damao island, 163 feet (49m7) high, and partially cleared, and Micota (Mikota) islet, the southern part of which is thickly wooded, which lies close south-eastward, are separated from an irregular shaped peninsula of the mainland, about a quarter of a mile southward, by Damao channel, which has depths in the fairway of 5 fathoms (9m1), but it is narrow and tortuous, and encumbered by islets and rocks.

Peaked islet, a rocky islet, 82 feet (25m0) high, lies close northward of Damao island.

Chinicaran (Chinikaran) island, 320 feet (97m5) high, lies about 1¼ miles south-south-eastward of Balulu point, near the western shore of Malipu bay, from which it is separated by Chinicaran (Chinikaran) passage, with a least depth of 1¾ fathoms (3m2). Talbaguen islet lies close northward of, and on the bank, extending about 2 cables from Chinicaran island. Two shoals, with depths of 5 and 4 fathoms (9m1

Digitized by Google

Chart 2911.

and 7m3) over them, lie in the northern approach to Gulang Gulang, about 3½ and 2½ cables, respectively, northward of Talbaguen islet. Gulang Gulang is a village on the western shore of Malipu bay, about 1½ miles southward of Balulu point.

Cinaran (Kinaran) bay, at the head of Malipu bay, is entered between the eastern end of Chinicaran island and the extremity of a spur of Hunch hill, 454 feet (138m4) high, 4½ cables south-eastward.

There is good anchorage, in depths of from 6 to 8 fathoms (11m0 to 14m6), mud, in the outer part of Malipu bay, midway between Chinicaran and Malaoton islands.

Inner sound.—Dangers.—From Alcade point, the southern entrance point of Damao channel from eastward, the south-western shore of the inner sound trends generally south-eastward for about 4¾ miles to Seamer point, and is much indented; Cap rock, 14 feet (4m3) high, lies about 1½ cables offshore, about midway between Alcade and Seamer points.

Between Balauan point (page 185) and Bancalon (Bankalon) point, about 2½ miles eastward, the northern shore of the sound forms a bay, near the head of which, and one mile northward, of Bancalon point, is situated the settlement of Pancol (Pankol).

Little sound is entered between Entrance island, 115 feet (35m0) high, situated close offshore, about one mile south-eastward of Bancalon point, and Malutone islet, 175 feet (53m3) high, a quarter of a mile southward.

Stumps islet, 125 feet (38m1) high, lies between Malutone islet (*Lat. 10° 50′ N., Long. 119° 26′ E.*) and Isthmus point, on the mainland, about 3½ cables south-south-eastward.

The depths in Little sound decrease gradually, from about 2 fathoms (3m7), in the entrance, to the mouth of Malapajo river, which nearly dries, at its head. This river is navigable by boats as far as the commencement of a track leading to Taytay, the municipal headquarters of the area, situated on the eastern side of Palawan about 2 or 3 miles distant.

Channel rock, 2 feet (0m6) high, lies in the entrance to Little sound, nearly half a mile eastward of Malutone island; Brother islets, 30 and 40 feet (9m1 and 12m2) high, lie near the southern shore of the sound, about 4½ and 6 cables, respectively, south-eastward of Channel rock.

Coloma (Koloma) rock, with a depth of 1½ feet (0m5) over it, coral, lies near the middle of the inner sound, about 2 miles west-south-westward of Isthmus point.

From Isthmus point the eastern shore of the sound trends southward for about 2 miles to Green hill, a small peninsula of the mainland, 162 feet (49m4) high, close eastward of which lies the settlement of Guinlo.

The head of the inner sound, south-eastward of Cap rock, is shallow; mud flats, with depths of less than 6 feet (1m8) over it, extend about 2 miles offshore from Alligator point at its head.

Cliff islet and Bay islet are two small islets, 35 and 64 feet (10m7 and 19m5) high, situated in the south-eastern part of the inner sound, about 1½ and 3½ miles, respectively, southward of Green hill.

Anchorage.—Directions.—There is good anchorage, in depths of from 10 to 12 fathoms (18m3 to 21m9), mud, in the bay on the western side of Endeavour strait.

Charts 3820, 967, 2660b, 1263.

Digitized by Google

Chart 2911.

In addition to the anchorages described above, large vessels can anchor, in greater depths than 5 fathoms (9m1), anywhere in Malampaya inner sound, taking care to avoid the vicinity of Coloma rock; many of the bays and coves indenting the shores of the inner sound afford anchorage and shelter to small craft.

Vessels entering Malampaya sound through Worcester strait should steer for the northern extremity of Malapina island, bearing 122°, which leads north-eastward of Entrance and Largon rocks, and south-westward of White Round islet.

Vessels proceeding to the anchorage in Taitai bay from northward, should round Taitai islet within half a mile, and those from southward should round Bullock head within the same distance, in order to avoid Huron rock.

Small vessels proceeding southward through Endeavour strait should keep in mid-channel; great care should be taken in rounding Chase head (*Lat. 11° 01′ N., Long. 119° 18′ E.*) to avoid being set on to the shore reef by the tidal streams, which are sometimes strong in this vicinity.

Vessels approaching the inner strait from northward should steer for Wedge head, bearing about 159° until the northern extremities of Calabuctung islets are in line, bearing 105°, when they will be southward of Huron rock. From this position course can be shaped to pass either eastward or westward of Palcocotan and Durangan islands, and north-eastward or south-westward of Malaoton island.

Vessels entering by the channel eastward of Palcocotan island should keep on the south-western side of the channel between Passage and Durangan islands, in order to avoid the dangers south-westward of Passage island, but the south-eastern end of Durangan island should be given a berth of at least one cable.

Vessels passing westward of Durangan island should take care to avoid the shoal, with a depth of about one foot (0m3) over it, close westward of it.

There are several channels, navigable by small craft, in addition to those described above; vessels using these should generally avoid approaching rocky points, near which there are frequently inshore dangers.

Tidal streams.—The tidal streams in Worcester strait are strong, and with contrary winds there are heavy tide-rips.

COAST.—Port Cataaba.—Port Cataaba (Kataaba), entered between Signal head and Black Rock point, 5½ cables east-north-eastward, affords good shelter for small vessels, and is free from dangerous winds from the mountains, to which some of the other anchorages in this part of Palawan are subject.

An islet, connected to the western shore of the entrance by a ridge of rocks, lies 6½ cables south-eastward of Signal head; a spit, with a depth of 3¾ fathoms (6m9) over it, extends about one cable northward from the islet. Pin point lies about 6 cables south-eastward of the islet.

White Point islet, 145 feet (44m2) high, lies on the shore reef about 1½ cables southward of Pin point; a reef, on which there is a rock, 35 feet (10m7) high, extends one cable north-eastward from the islet.

The head of the port, southward of Beehive head, situated about

Digitized by Google

Chart 2911.

half a mile southward of Pin point, is encumbered by mud flats; Pig point, about one mile south-eastward of Beehive head, divides the head of the port into two bays, both of which nearly dry.

Cataaba (Kataaba) river, with depths in the entrance of only 3 feet (0m9), discharges into the eastern bay. For about 3 miles above its mouth the river flows through mangrove and nipa swamps, and has d pths of about 1½ fathoms (2m7).

Anchorage.—The best anchorage is, in depths of from 5 to 7 fathoms (9m1 to 12m8), mud, eastward of Pin point.

Coast.—Difficult point lies about three-quarters of a mile north-north-eastward of Black Rock point (*Lat. 11° 02′ N., Long. 119° 20′ E.*); between them the coast forms a long narrow inlet, with depths of from 10 fathoms (18m3) near the entrance, to 6¼ fathoms (11m4), about a quarter of a mile from its head. The shores are bordered with mangroves, and fringed with coral reefs, which, on its southern side, extend nearly 2 cables offshore; a shoal, with a depth of 3 feet (0m9) over it, lies near the head of the inlet.

Between Difficult point and a point 7 cables north-westward, there are two coves, both of which are encumbered with coral reefs. Ragged islet, 60 feet (18m3) high, lies on the reef which extends about 1½ cables southward from the latter point, and a 4¾-fathom (8m7) patch lies about 1½ cables farther southward. The coast thence to Pagauanen (Custodio) point, about 3 miles northward, is bold and rocky, with several landslips which appear as reddish coloured vertical stripes.

A range of hills stretches from close northward of Difficult point to a point situated about half a mile eastward of Pagauanen point; Coast hill, 835 feet (254m5) high, about midway between them, is the greatest elevation; it is a flat hill and not very prominent from westward. A hill, 496 feet (151m2) high, lies close eastward of Pinagpanacan (Pagauanen) point, half a mile southward of Pagauanen point.

Pagauanen point is the extremity of the densely wooded promontory which forms the western side of Bacuit bay (page 192); a group of rocks, above water, extends about 1¼ cables northward from the point.

Off-lying islet and dangers.—For Saddle and Camago islands, about one mile north-westward of Signal head, *see* page 181.

Tent islet, 86 feet (26m2) high, with nearly vertical sides, lies about 1½ miles north-westward of Ragged islet. Tent islet lies on a reef which extends about a quarter of a mile northward from it and on which are several rocks above water; near the northern end of the reef is a rock, which dries about 3 feet (0m9). A 5-fathom (9m1) patch lies about 4½ cables northward of Ragged islet and about 2½ cables offshore. A rock, 50 feet (15m2) high, lies on the coastal reef, 7 cables southward of Pinagpanacan point.

Between Pagauanen point and a point about half a mile eastward the coast forms a bay, which is filled with coral reefs; a detached coral shoal, with a depth of 1½ feet (0m5) over it, lies about 3 cables east-north-eastward of the former point.

A reef extends about 1½ cables north-eastward from the eastern entrance point of the bay described above; Flat rock, 24 feet (7m3) high, lies near the outer end of this reef.

Chart 3820.

Islands and dangers in approach to Bacuit bay.—A remarkable group of limestone islands, extends about 8 miles north-north-

Digitized by Google

Chart 3820.

westward from Pagauanen point. The sides of these islands consist of perpendicular cliffs, of every variety of colour, in which are numerous caves, with occasional white sandy beaches in sheltered spots at their bases.

The summits of the islands consist of clusters of needle peaks, and, wherever it is possible to take root, screw pines and other vegetation grow luxuriantly. The bases of the cliffs have been undermined in places by the action of the sea for from 15 to 20 feet (4^m6 to 6^m1), making it almost impossible to land, except where an occasional land-slip or disruption has occurred.

Chart 2911.

South Guntao island, 604 feet (184^m1) high, lies with its southern extremity about $3\frac{3}{4}$ miles westward of Pagauanen point; North Guntao island, 531 feet (161^m8) high, and of a reddish brown colour, lies about a quarter of a mile north-westward of the western extremity of South Guntao. These islands are densely wooded on top, and have bare or shrub-covered uniformly sloping sides; they are joined by a coral reef, which dries, and reefs, with rocks and large boulders, fringe their coasts except near the northern end of the northern island. Pinnacle rock, 25 feet (7^m6) high, lies close off the south-western end of North Guntao island.

Destacado rocks, 20 feet and 12 feet (6^m1 and 3^m7) high, having the appearance of two boats, lie on a reef about $1\frac{1}{4}$ miles west-south-westward of Pinnacle rock; there are also several rocks, awash, on this reef. A shoal, with a depth of about 4 feet (1^m2) over it, lies about a quarter of a mile south-westward of the 12-foot (3^m7) rock.

Guintungauan Grande island (*Lat. 11° 07′ N., Long. 119° 18′ E.*), 235 feet (71^m6) high, lies about $1\frac{1}{4}$ miles westward of Pagauanen point; when seen from northward or southward it resembles a large block figure of eight; its coast consists of vertical undercut cliffs except for a small sandy beach on the eastern side.

Guintungauan Pequeño islet (Jip rocks), 108 feet (32^m9) high, lie about half a mile north-north-eastward of Guintungauan Grande island. A $2\frac{3}{4}$-fathom (5^m0) patch lies about $1\frac{1}{2}$ cables north-eastward of the islet.

Pangulasian island, 533 feet (162^m5) high, with wooded sloping sides, lies about half a mile north-north-eastward of Pagauanen point; it is bordered by a beach except on the western side, and fringed by a reef.

The channel between Pangulasian island and the mainland is about 2 cables wide between the reefs which extend from either side, and has depths in the fairway of from 14 to 18 fathoms (25^m6 to 32^m9).

Popolcan (Popolkan) islet, 308 feet (93^m9) high, lies on the western side of the approach to Bacuit bay, about a quarter of a mile north-eastward of the eastern extremity of Pangulasian island; a spit extends about half a cable south-eastward from the islet.

Entalula island, 520 feet (158^m5) high, and precipitous, lies about half a mile northward of Pangulasian island; it is fringed by a narrow coral reef, with depths of from 16 to 20 fathoms (29^m3 to 36^m6) close-to.

Paglugaban island, 555 feet (169^m2) high, lies $6\frac{1}{2}$ cables west-north-westward of Entalula island; from the northern end of the island a reef, on which there is an islet, 285 feet (86^m9) high, extends about a quarter of a mile northward.

Charts 967, 2660b, 1263.

Digitized by Google

Charts 2911, 3820.

Miniloc (Minilok) island, 1,222 feet (372m5) high, with several precipitous crags, lies close northward of the islet northward of Paglugaban island, being separated from the islet by a channel about one cable wide, with depths of from 10 to 12 fathoms (18m3 to 21m9). The coast consists mainly of cliffy headlands and is indented by several bays on the southern and eastern sides; the bay on the north-eastern side of the island has depths of 20 fathoms (36m6), but at low water its entrance is blocked by coral reefs. Landing is possible at a few places on the southern and western sides of the island.

Two high islets lie within a quarter of a mile eastward of the eastern extremity of Miniloc island, and three similar islets lie off its north-western point; the highest and northernmost of the latter group, 140 feet (42m7) high, lies about 4 cables north-north-westward of the point.

Charts 2911, 3820.

Matinloc (Matinlok) island consists of a narrow ridge of limestone, almost divided into three parts by deep gaps. Binayan point (*Lat. 11° 08′ N., Long. 119° 17′ E.*), its southern extremity, lies about 1½ miles westward of the south-western extremity of Miniloc island, from which it is separated by a deep channel. Mount Horn, which, when seen from northward or southward, resembles a horn, lies near the middle of the island; it rises to an elevation of 1,299 feet (395m9), and is prominent. Ilog bay, on the eastern side of the island, close under Mount Horn, affords shelter for small vessels with local knowledge during the South-west monsoon; Palilo islet lies near the southern side of the entrance to the bay. The eastern side of this part of the island is wooded, the remainder of the island being bare or covered with brush and pandanus.

Chart 3820.

Tapiutan island, the north-western island of the group, lies close westward of the northern end of Matinloc island, from which it is separated by a channel, about 1½ cables wide, with depths of from 15 to 21 fathoms (27m4 to 38m4). The island rises to a round-topped summit, 1,460 feet (445m0) high, close northward of which, and separated from it by a low neck, is another round-topped hill, 715 feet (217m9) high. The coasts of the island are bold, with vertical undercut cliffs and a few sandy beaches.

About 2 cables south-westward of Seribillas point, the northern extremity of Tapiutan island, is Binangculan point, the termination of a precipitous peninsula. Binangculan bay, which lies close southward of Binangculan point, is encumbered by coral reefs and affords little protection even with north-easterly winds.

Inambuyod island lies with its northern extremity 8½ cables eastward of Culasa point, the northern extremity of Matinloc island; seen from a distance the island appears as a large turtle in the water, with its head northward. The northern end of the island rises to an elevation of 695 feet (211m8). On the western side of the island there are several small bays, with sandy beaches at their heads, on which landing is possible.

Inambuyod rock, 150 feet (45m7) high, lies about one cable northward of Inambuyod island; Picanayas island, 125 feet (38m1) high, and shaped like a mushroom, lies about 3½ cables east-north-eastward of the southern extremity of that island.

Charts 3807, 967, 2660b, 1263.

Digitized by Google

Chart 3820.

Tambalanang islet, 140 feet (42m7) high, and shaped like a crown, lies about one mile northward of Inambuyod island.

Dilumacad (Dilumakad) island, 780 feet (237m7) high, lies about 2¼ miles eastward of Inambuyod island. On the eastern side of this island, from which a spit, with a depth of 22 feet (6m7) over it, extends about a quarter of a mile eastward, there is a sandy beach, fringed with coral reefs. The western side of the island consists of overhanging cliffs; near the southern end there is a prominent group of needle peaks.

Two shoals, with depths of 27 and 10 feet (8m2 and 3m0) over them, lie about 1¼ miles south-eastward and the same distance eastward, respectively, of the eastern extremity of Dilumacad island.

Cadlao (Kadlao) island lies with its south-eastern extremity close northward of the northern end of Ipil point, situated about 6 miles north-eastward of Pagauanen point; a spit, with a depth of 16 feet (4m9) over it, extends about one cable south-eastward from the south-eastern extremity of the island, leaving a deep channel, about 3 cables wide, between it and the northern side of Ipil point (*Lat. 11° 10′ N., Long. 119° 23′ E.*).

The summit of Cadlao island is a table top, 1,955 feet (595m8) high, which is very prominent from westward; the Loggerheads, two peaks, 1,470 and 1,762 feet (448m0 and 537m1) high, respectively, from which the land drops almost vertically to an elevation of about 800 feet (243m8), lie south-eastward of the summit.

The island is fringed with coral, except where the limestone cliffs extend to the coast, and there are sandy beaches at the heads of the bays; the cliffs are considerably undercut by the action of the waves.

Calaragnan point, the western extremity of Cadlao island, and Macamo point, its north-eastern extremity, are prominent. Ubugun point is the south-western extremity of the island.

An islet, 310 feet (94m4) high, lies about one cable from the eastern side of Cadlao island about midway between Macamo point and the south-eastern extremity of the island. Two shoals, with depths of 34 and 28 feet (10m4 and 8m5) over them, lie half a mile eastward and one mile north-eastward, respectively, of this islet.

Mitre islet, 355 feet (108m2) high, lies in the entrance to a bay on the north-eastern side of the island, about 6½ cables north-westward of Macamo point; a rock, awash, and a 2-fathom (3m7) patch lie about one and 2½ cables, respectively, south-south-westward of the islet.

Cauayan (Kauayan) island, situated with its southern extremity about three-quarters of a mile north-eastward of Bulybarco (Bulybarko) point, the northern extremity of Cadlao island, is of limestone formation, with in most places undercut cliffs, from 100 to 300 feet (30m5 to 91m4) high. The island rises to two peaks, separated by a neck of land only a little above sea level; the northern peak is 820 feet (249m9) high.

An islet, 295 feet (89m9) high, with undermined cliffs, lies in mid-channel between Cauayan and Cadlao islands.

Caverna (Kaverna) island, 375 feet (114m3) high, the northernmost island of the group, lies about a quarter of a mile north-westward of Cauayan island. Caverna island is of limestone formation with undercut cliffs; near its northern side is a pinnacle rock, which is prominent when seen from eastward or westward. A reef, awash, extends about

Digitized by Google

Chart 3820.

one cable southward, and a detached rock, 91 feet (27m7) high, lies close eastward of the island.

Anchorages.—There is anchorage, sheltered from north-easterly winds, in depths of from 16 to 20 fathoms (29m3 to 36m6), southward of Cadlao island and eastward of Dilumacad island.

There is good anchorage in south-westerly winds, in a depth of 17 fathoms (31m1), stiff mud, near Mitre islet; in depths of from 9 to 12 fathoms (16m5 to 21m9), close eastward of Macamo point, or in similar depths, near the islet one mile southward of that point.

Charts 2911, 3820.

BACUIT BAY.—Dangers.—Bacuit (Bakuit) bay, entered between Flat rock (page 188) and Ipil point, is protected from westward by the rugged limestone islands described above and the promontory of the mainland southward of them. A range of mountains, amongst which there are some curiously shaped peaks, dominates the eastern shore of the bay, and a range of hills, from 200 to 500 feet (60m1 to 152m4) high, also extends along this shore of the bay close inland.

Ipil point is fringed by a steep-to coral reef which extends about half a cable offshore; close north-eastward of the point the land rises steeply to a peak, 1,543 feet (470m3) high.

Chart 2911.

Bigun bay, entered between Flat rock and Cudugman (Kudugman) point (*Lat. 11° 05′ N., Long. 119° 21′ E.*), about 1½ miles south-eastward, is encumbered by coral reefs, which, near its centre, extend about half a mile offshore. White rock, 75 feet (22m9) high, lies on the reef 6 cables south-south-eastward of Flat rock. Cudugman point is the extremity of a limestone peninsula, rising to an elevation of 602 feet (183m5), and terminating in a group of needle peaks. The vertical cliffs of this peninsula are undermined in places by the action of the sea for from 20 to 30 feet (6m1 to 9m1), and are covered with vegetation wherever it can find room to root.

Cudugman (Kudugman) bay, close southward of Cudugman point, is encumbered by coral reefs, which extend in places nearly half a mile offshore.

Chart 3820.

Manmegmeg bay is entered between Ipil point and Depeldet islet, 234 feet (71m3) high, nearly 2 miles south-south-eastward, and connected at low water to the mainland south-eastward. A coral shoal, with a depth of 2 fathoms (3m7) over it, lies in the entrance to the bay nearly one mile southward of Ipil point, and a 10-foot (3m0) patch lies about half a mile farther eastward. A 39-foot (11m9) patch lies about half a mile north-westward of Depeldet islet.

Corongcorong bay, a cove in the northern part of Manmegmeg bay, affords shelter from northerly winds, for small vessels communicating with the town of Bacuit, situated about one mile east-north-eastward of Ipil point. Corongcorong bay is separated from Manmegmeg bay by a coral reef which extends about 3¾ cables offshore, and near the outer edge of which are several coral boulders, which dry about 2 feet (0m6), situated about 8 cables north-north-eastward of Depeldet islet.

Chart 2911.

Dilarog point lies about one mile south-eastward of Depeldet islet; between them coral reefs extend about a quarter of a mile offshore.

Charts 967, 2660b, 1263.

Digitized by Google

Chart 2911.

Danet bay, entered between Dilarog point and Ciminaytay (Kiminaytoi) point, 172 feet (52m4) high, about 1½ miles south-south-eastward, is much encumbered by coral reefs, extending as much as 9 cables from its head. One of these reefs, which dries, lies about 6 cables south-eastward of Dilarog point.

Manlalec (Manlalek) river discharges into Manlag bay, at the southern end of Danet bay; Manlalec (Manlalek) village is situated about half a mile up the river. Between Ciminaytay point and the mouth of Langeblangeban river, about 4¼ miles southward, the eastern shore of Bacuit bay is fringed by reefs, which extend as much as 4 cables offshore. This river flows through a mangrove swamp and discharges into Langeblangeban (Kamago) bay.

On the western side of Bacuit bay, between Cudugman point and Camago mabajul (Kiminaytoi) point, about 3 miles south-eastward, reefs and shoals, some of which dry, extend about 4 cables offshore.

The head of Bacuit bay between Camago mabajul point and Camago maita (Long) point, the western entrance point of Caparayan (Kaparayan) river, about 1½ miles eastward, is fringed by reefs, which extend in places half a mile offshore. Several small rivers discharge into the bay through the mangrove swamp by which it is bordered.

Charts 2911, 3820.

Islands and dangers.—A 7-fathom (12m8) patch lies in the middle of the entrance to Bacuit bay, about 1¾ miles south-westward of Ipil point.

Inabuyatan island, 1,105 feet (336m8) high, situated in the entrance to Danet bay about 6 cables south-westward of Dilarog point (*Lat. 11° 08′ N., Long. 119° 44′ E.*), is a prominent island, somewhat resembling an elephant on its haunches; this island is steep-to on all sides.

A group of shoals, with a least depth of 5 fathoms (9m1) over them, lies about half a mile north-westward of Inabuyatan island, and a coral patch, with a least depth of 3¾ fathoms (6m9) over it, and with depths of 16 fathoms (29m3) close-to, lies about 1¼ miles westward of the island. This patch is the most serious danger in the entrance to Bacuit bay.

Comocutuan (Komokutuan) islet, 282 feet (85m9) high, and steep-to, lies about 6½ cables northward of Cudugman point. Malpacao (Malpakao) island is a remarkable ridge of limestone, 565 feet (172m2) high, with a detached boulder, 310 feet (94m4) high, near its north-eastern extremity; it lies about half a mile west-south-westward of Ciminaytay point, from which it is separated by a channel which is foul; from a distance it appears as a double island.

Two reefs, which dry, lie about 3½ cables south-eastward and 5½ cables eastward, respectively, of Carat (Karat) point, the southern extremity of Malpacao island.

Lagen island, the largest island in Bacuit bay, rises to two summits, 1,130 feet and 1,220 feet (344m4 and 371m9) high, respectively; Pabilat point, its northern extremity, lies about 8½ cables westward of Carat point. The coast of this island consists of sandy bays alternating with perpendicular cliffs, about 400 feet (121m9) high. The southern and eastern sides of the island are fringed with coral, and the channel between it and the mainland eastward is much encumbered by reefs, above and below water.

Two coral reefs, awash, lie midway between Diculacud (Dikulakud)

Digitized by Google

Charts 2911, 3820.

point, the southern extremity of Lagen island, and Camago maita point, and another reef, awash, lies half a mile south-south-eastward of Diculacud point, with a 2¼-fathom (4m1) patch about midway between them.

Pinsail islet, 310 feet (94m4) high, and Ninepin islet, 220 feet (67m1) high, lie 11½ and 8½ cables, respectively, westward of Diculacud point. Pinsail islet is almost connected to two rocks, the higher of which is 80 feet (24m4) high, at low water, lying about a quarter of a mile southward.

Dibuluan island, 545 feet (166m1) high, with two prominent cliffs on its western side, lies about 1½ miles south-eastward of Cudugman point; it is fringed with reefs, which extend about 6½ cables south-south-eastward. Several coral reefs, some of which dry, lie between the island and the mainland south-westward of it.

Anchorage.—Directions.—There is well protected anchorage, in depths of from 6 to 7 fathoms (11m0 to 12m8), close south-eastward of Malpacao island, taking care to avoid the coral reefs south-eastward of Carat point.

There is also anchorage, in depths of from 9 to 10 fathoms (16m5 to 18m3), mud, south-eastward of Pinsail and Ninepin islets and southward of Lagen island, but this position is subject to variable winds during heavy weather.

Small craft can anchor in many of the inlets and coves along the shores of the bay.

Vessels approaching Bacuit bay from southward should do so by the channel between Paglugaban and Entalula islands, described on page 189, which is clear of dangers.

From northward the best approach is between Inambuyod and Dilumacad islands (page 191), and if proceeding to the anchorage south-eastward of Malpaco island (*Lat. 11° 06′ N., Long. 119° 24′ E.*), a vessel should take care to avoid the 3¾-fathom (6m9) coral patch westward of Inabuyatan island, and pass between Malpacao and Lagen islands; the channel between Malpacao island and Ciminaytay point should not be attempted without local knowledge.

Chart 3820.

Tidal streams.—The tidal streams in Bacuit bay are weak.

Coast.—Aspect.—A central range of mountains, the continuation of the range eastward of Bacuit bay, overlooks both coasts of Palawan; it attains its greatest elevation eastward of Cadlao island, in a table-topped mountain, the north-western and south-eastern shoulders of which, 1¼ miles apart, are, respectively, 1,950 feet and 2,160 feet (594m4 and 658m4) high.

A sharp peak, 1,540 feet (469m4) high, lies 2½ miles southward of the south-eastern shoulder, and several hills of lesser elevation border the coast, the features of which are entirely different from those of the limestone formation; this is most evident at the back of Bacuit town, where a sudden transition occurs.

East peak, about 4½ miles north-eastward of the table-topped mountain described above, is cone shaped, and 1,725 feet (525m8) high. This peak is not generally visible from westward until a considerable distance offshore; it is, however, conspicuous from northward and eastward.

Bacuit.—Anchorage.—Close eastward of the peninsula of which

Digitized by Google

Chart 3820.

Ipil point is the western extremity, is a small bay, at the head of which is the town of Bacuit (Bakuit).

A 25-foot (7m6) patch lies in the north-eastern approach to the bay, 6½ cables east-north-eastward of the south-eastern extremity of Cadlao island. The shores of the bay are fringed by a reef. A bank, with depths of less than 3 fathoms (5m5) over it, extends about half a mile from the head of the bay, and on it are several rocks with depths of less than 6 feet (1m8) over them.

The best anchorage is, in depths of from 8 to 9 fathoms (14m6 to 16m5), mud, about one mile northward from the town, sheltered from all but northerly winds. In heavy weather variable squalls from the hills, of hurricane force, blow home into this anchorage.

The town is the most important on the west coast of Palawan. A few provisions may be obtained. There is communication by steamer with Manila. There is a pier, with a depth of 6 feet (1m8) at its head, at the western end of the town. There is a prominent church in the town.

COAST.—Dangers.—Between the eastern entrance point of the bay described above and Mansalauit point, about 3¼ miles north-north-eastward, the coast is fringed by a reef, which extends a quarter of a mile offshore in places. There are two pinnacle rocks, 20 feet (6m1) high, on this reef about 1½ miles southward of Mansalauit point. Several shoals, with depths of less than 6 fathoms (11m0) over them, lie within 1½ miles of this stretch of coast, the positions of which may be seen on the chart.

Mansalauit (Emmit) islet, 190 feet (57m9) high, and wooded, with two detached rocks near its northern end, lies on the coastal bank about 2 cables west-north-westward of Mansalauit point.

Between Mansalauit point (*Lat. 11° 15′ N., Long. 119° 25′ E.*) and Calitang (Crawford) point, 160 feet (48m8) high, about 3¾ miles northward, the coast is clear of dangers, and in places there are depths of 6 fathoms (11m0) close-to. A rock, 30 feet (9m1) high, lies close offshore about midway between the two points. Two rocky islets, the northern of which is 110 feet (33m5) high, and the southern, 90 feet (27m4), lie close northward of Calitang point, to which they are joined by a reef.

Aspect.—About midway between Cailtang point, on the west coast, and Darocotan (Darokotan) point, on the east coast of Palawan, about 8½ miles east-north-eastward, a hilly, wooded promontory extends northward for about 6 miles, terminating in Libro point, the north-western, and Cabuli point, the north-eastern extremities of the island.

A ridge commences at a peak, 1,200 feet (365m8) high, about 4¾ miles east-north-eastward of Calitang point, and extends 3½ miles northward to North hill, 935 feet (285m0) high, near the eastern side of the island, and a hill, 965 feet (294m1) high, about 4 cables from the western side of the island; both these hills are prominent.

A hill, 475 feet (144m8) high, rises about half a mile southward of Libro point, and a hill, 550 feet (167m6) high, lies close inland from Cabuli point; both these hills are inconspicuous except from eastward or westward.

Coast.—Dangers.—Between Calitang point and a point about 2 miles north-eastward, the coast forms a bay at the head of which is a

Digitized by Google

Chart 3820.

sandy beach, from which shoals, with depths of less than 5 fathoms (9m1) over them, extend in places about 4 cables offshore. A rock, 60 feet (18m3) high, lies on the coastal bank about 1½ miles north-eastward of Calitang point. Patuyo point lies about half a mile north-eastward of the north-eastern entrance point of the bay described above.

Barotoan bay is entered about 6½ cables eastward of Patuyo point; a bank, with depths of less than 3 fathoms (5m5) over it, extends about half a mile from the head of the bay. A rock, 8 feet (2m4) high, lies close off the western entrance point.

The coast between Barotoan bay and Libro point is bold and rocky, with occasional sandy beaches, fringed with coral. A 25-foot (7m6) patch lies about 2¾ cables offshore and 3¼ miles north-eastward of Patuyo point. Base bay is entered between Patuyo point and a point about 4 miles north-eastward; between the latter point and a point about three-quarters of a mile north-north-eastward is Diapila bay. A rock, awash, lies about 3 cables westward of the northern entrance point of this bay.

Off-lying islands and dangers.—Bury (Buri) islets, about 8½ cables northward of Calitang point, are two rocky islets, 70 and 60 feet (21m3 and 18m3) high, lying on the same reef.

Agutayan (Lalutaya) island, 400 feet (121m9) high, lies 1¼ miles north-westward of Patuyo point, with a channel, with a least depth of 7 fathoms (12m8) in the fairway between. The island is steep-to except on the western side, where there is a bay, with a depth of 2¾ fathoms (5m0), and on the eastern side, where coral reefs extend about 2 cables offshore. A shoal, with a depth of 3 feet (0m9) over it, lies about 4 cables north-westward of the north-eastern extremity of the island.

Vito (Diapila) island (*Lat. 11° 23′ N., Long. 119° 27′ E.*), 215 feet (65m5) high, lies about 2½ miles east-north-eastward of Agutayan island.

Cubud (Kalitan) island, 210 feet (64m0) high, lies about half a mile westward of Libro point; a reef, on which there is a sharp double rock, 65 feet (19m8) high, extends 2 cables eastward from the island.

Cabuli (Kabuli) island, 455 feet (138m7) high, with rather a flat summit, lies about a quarter of a mile northward of Cabuli point; there is a depth of 34 feet (10m4) in the fairway of the channel between them.

Charts 3807, 967, 2660b, 1263.

Digitized by Google

CHAPTER IX

PALAWAN PASSAGE, AND THE DANGEROUS GROUND BETWEEN IT AND THE MAIN ROUTE THROUGH THE CHINA SEA; THE NORTH COAST OF LINAPACAN, AND THE WEST COASTS OF THE CALAMIAN GROUP AND MINDORO

Chart 967.

PALAWAN PASSAGE.—Palawan passage is a deep passage between the wide bank which fronts the west coast of Palawan, and the eastern side of the "Dangerous ground" which lies from about 30 to 50 miles farther westward.

Climate and weather.—*See* page 22.

Current.—Caution.—Mariners are warned that a strong north-westerly set is experienced in the southern part of Palawan passage westward and north-westward of Balabac island and North Balabac strait during the height of the North-east monsoon. *See* also caution on page 22.

Chart 2660b.

Dangerous ground.—A large area between the parallels of 7° 33′ N., and 12° 00′ N. and the meridians of 112° 50′ E. and 117° 44′ E., enclosed on the charts by a pecked line, is known to abound with dangers; vessels are cautioned not to attempt to pass within this area.

Erica reef, which dries and encloses a lagoon, lies in lat. 8° 06′ N., long. 114° 09′ E.

The western extremity of Investigator shoal lies about 21 miles eastward of Erica reef. The shoal, which extends about 18 miles eastward, is an irregular atoll formation and is surrounded by a coral reef, which dries in places. There are a few detached rocks mostly situated at the western end of the shoal.

The western extremity of Commodore reef lies about 25 miles north-eastward of the eastern extremity of Investigator shoal. It dries in patches around its whole circumference, and contains two lagoons, with a sand cay, one foot (0m3) high, on the neck between them.

Mariveles reef, which dries and encloses two lagoons, lies about 13 miles south-westward of Erica reef.

Barque Canada, a reef which dries, lies with its south-western extremity about 20 miles north-eastward of Amboina (Amboyna) cay, which is described in China Pilot, Vol. I, and extends about 18 miles north-eastward; at its north-eastern extremity there is a group of rocks, about 6 feet (1m8) high.

Alison reef, which dries and encloses a lagoon, lies with its western extremity about 50 miles northward of Mariveles reef. The northern

Digitized by Google

Chart 2660b.

extremity of Cornwallis South reef lies about 6½ miles eastward of Alison reef; the reef dries but it has not been thoroughly examined.

Cornwallis South reef lies with its northern extremity about 6½ miles eastward of Alison reef; the reef, which dries, encloses a lagoon.

Tennent reef, which dries and encloses a lagoon, lies with its south-western extremity about 25 miles east-north-eastward of Cornwallis South reef; there are numerous rocks above water on the reef. There appears to be no entrance to the lagoon.

Pearson reef, which dries and encloses a lagoon, to which there is no apparent entrance, lies with its north-eastern extremity about 13 miles north-westward of Alison reef; there is a sand cay, 3 feet (0m9) high, on the north-eastern extremity of the reef.

Maralie reef, with a depth of one fathom (1m8) over it and steep-to, lies about 14 miles northward of Pearson reef.

Johnson reef and Collins reef lie at the south-western end of Union banks and reefs, about 46 miles north-eastward of Maralie reef.

Union banks and reefs extend about 30 miles north-eastward from Johnson reef. Sin Cowe island, 12 feet (3m7) high, lies on the western side of the banks, about 9 miles northward of Johnson reef, and Whitsun reef lies at the north-eastern extremity of the banks and reefs.

West York island, in lat. 11° 05′ N., long. 115° 01′ E., is covered with trees and bushes, and has some tall coconut trees near its southern end.

Irving reef, which dries in patches and encloses a lagoon, lies about 12 miles south-south-westward of West York island. Menzies reef, awash, lies about 14 miles west-north-westward of West York island.

Chart 967.

South-eastern part of Dangerous ground.—Half Moon shoal is situated on the western side of the passage about 60 miles north-westward of Cape Buliluyan (page 154), the southern extremity of Palawan; it consists of a belt of coral, awash, on which is Inclined rock (*Lat. 8° 52′ N., Long. 116° 18′ E.*), one foot (0m3) high, lying on the eastern side of the reef. There are two channels into the lagoon, situated, respectively, 2 and 5 cables southward of Inclined rock; the southernmost of these, the entrance to which is marked on the northern side by a group of rocks, which dry about 2 feet (0m6), has a depth of about 7 fathoms (12m8). In the lagoon there are depths of from 14 to 16 fathoms (25m6 to 29m3), with numerous patches of coral.

Royal Captain shoal is situated on the western side of the narrowest part of the passage, about 23 miles east-north-eastward of Half Moon shoal. This shoal consists of an unbroken coral reef from about half a cable to 2 cables wide, on which are a few rocks which dry; Observation rock, which dries about 4 feet (1m2), lies on the northern end of the reef. The outer edge of the reef is steep-to, with depths greater than 100 fathoms (182m9) within half a cable. At high water boats can cross the reef and enter the lagoon, in which there are depths of from 15 to 17 fathoms (27m4 to 31m1), sand and coral, and in which there are also a number of coral patches.

Bombay shoal, situated on the western side of the passage about 27 miles north-north-eastward of Royal Captain shoal, is steep-to. The lagoon, in which there are depths of from 16 to 18 fathoms (29m3 to 32m9), sand, is completely enclosed by the coral reef, on which there are several rocks, which dry about 2 feet (0m6), the more conspicuous

Chart 1263.

Digitized by Google

Chart 967.

of which lie on the north-western and western parts of the reef. Madagascar rock, which dries about 2 feet (0m6), lies on the north-eastern extremity of this reef.

North-east Investigator shoal, which dries, lies about 15 miles west-north-westward of Royal Captain shoal.

Chart 2660b.

1st Thomas shoal, on which there are a few rocks, lies about 28 miles west-north-westward of North-east Investigator shoal; the reef dries and encloses a shallow lagoon. Alicia Annie reef lies about 26 miles westward of 1st Thomas shoal; the reef, which dries, encloses a shallow lagoon, and has numerous rocks on it which are just visible at high water.

Mischief reef, awash, lies about 28 miles northward of Alicia Annie reef; there are some rocks, which dry, on the reef, which encloses an extensive lagoon, which has three entrances.

Southampton reefs include Livock reef, about 19 miles north-westward of Mischief reef, and Hopps reef, about 4 miles north-eastward of Livock reef.

2nd Thomas shoal lies with its northern end about 20 miles eastward of Mischief reef; the reef encloses a lagoon, in which there are depths of about 15 fathoms (27m4). Boxall reef, about 19 miles eastward of the southern extremity of 2nd Thomas shoal, dries, but does not enclose a lagoon, nor are there any rocks visible at high water.

Sabina shoal lies with its eastern extremity about 26 miles north-westward of Bombay shoal; the eastern half of the shoal is composed of a number of reefs, awash, while the western half consists of a bank, over which there are depths of from 2 to 10 fathoms (3m7 to 18m3), and reefs enclosing a lagoon. Hardy reef, about 32 miles north-westward of Sabina shoal, dries, and has a narrow strip of sand in the middle.

Jackson atoll lies with Petch reef, its south-eastern extremity, about 28 miles north-westward of Hardy reef. The atoll, which has five reefs drying in patches on the encircling reef, encloses a lagoon, which has four entrances.

Nanshan island, 8 feet (2m4) high, with a few coconut trees on it, lies about 11 miles northward of Jackson atoll. About 5 miles farther northward is Flat island, a low flat sandy cay.

Hopkins reef, which is nearly awash, and breaks heavily, lies about 16 miles eastward of Flat islands (*Lat. 10° 49′ N., Long. 115° 50′ E.*).

Chart 967.

Iroquois and Baker reefs lie on the southern extremity of Amy Douglas bank, about 20 miles eastward of Nanshan island. It cannot be too strongly emphasised that this portion of the area is for practical purposes unexamined, although the positions and approximate limits of numerous shoals have been determined.

Carnatic shoal, with a depth of 21 feet (6m4) over it, lies about 48 miles north-eastward of Bombay shoal (page 198). Lord Auckland shoal, with a least depth of 8 fathoms (14m6) over it, lies about 15 miles northward of Carnatic shoal. Fairie Queen, with a depth of 9 fathoms (16m5) over it, lies about 26 miles north-eastward of Lord Auckland shoal. The positions of these three shoals is doubtful.

Seahorse or Routh bank, the northernmost known danger on the western side of Palawan passage, lies with its southern end about

Chart 1263.

Digitized by Google

Chart 967.

67 miles north-westward of Table point (page 167); it has a least known depth of 27 feet (8m2) over it, on a patch three-quarters of a mile in extent near the northern end of the bank. The least depth found elsewhere on the bank was 6 fathoms (11m0); inside the reef there are depths of from 19 to 29 fathoms (34m7 to 53m0).

Brown bank lies about 34 miles westward of the southern end of Seahorse bank. About 10 miles south-westward of Brown bank, a danger, named Brown, is charted, but its existence is doubtful. Pennsylvania North reef lies about 19 miles west-north-westward of Brown bank.

Sandy shoal, the position of which is doubtful, lies about 15 miles north-westward of the northern extremity of Seahorse bank. Templer bank, with a least depth of 10 fathoms (18m3) over it, lies about 25 miles west-north-westward of Sandy shoal, and Leslie bank lies between them.

Reed bank, with a depth of 12 fathoms (21m9) over it, lies about 28 miles north-westward of Templer bank. Marie Louise bank, with a depth of 15 fathoms (27m4) over it, was reported, in 1885, to lie in lat. 11° 54′ N., long. 116° 50′ E. Depths of from 10 to 15 fathoms (18m3 to 27m4) were reported, in 1928, to lie between Reed and Marie Louise banks, but it is probable there are less depths in this vicinity.

The dangers near the edge of the bank which fronts the coast of Palawan and forms the eastern side of Palawan passage, have been described in chapters VII and VIII.

Chart 2660b.

For Luconia shoals and other dangers in the south-western approach to Palawan passage, *see* pages 100-101.

Directions.—Directions for Palawan passage will be found in "Ocean Passages for the World."

Tidal streams.—In the vicinity of Bombay shoal the stream was observed to set north-eastward when the tide was rising.

Chart 3820.

ISLANDS AND DANGERS NORTH-EASTWARD OF PALAWAN.—Linapacan (Linapakan) island is the largest of an extensive group of islands lying between the north-eastern end of Palawan and the Calamian group; it is hilly throughout, rising to an elevation of 1,086 feet (331m0) in the south-eastern part. All the points are high, steep and rocky, with mangroves or sand beaches in the bays between them. There are two bays on the northern side of the island, both open north-westward, with several islets and rocks lying off some of the prominent points.

North-west bay, the western bay, is divided near its head into two arms. There is good well-protected anchorage for vessels with local knowledge in the eastern arm, in depths of from 18 to 19 fathoms (32m9 to 34m7), mud; vessels entering this arm should take care to avoid the rocks extending about 3½ cables offshore, about half a mile south-eastward of an islet, covered with tall grass, on the eastern side of the entrance.

Vanguardia islet (*Lat. 11° 32′ N., Long. 119° 44′ E.*), 91 feet (27m7) high, lies about 3 miles northward of the western entrance point of North-west bay; Alerta rock, 70 feet (21m3) high, lies about 1½ miles south-eastward of Vanguardia islet. Islets and dangers extend more

Digitized by Google

Chart 3820.

than half a mile northward of the western entrance point of North-west bay. A rock, awash, lies about midway between Alerta rock and the western entrance point of North bay. A rock, 60 feet (18m3) high, lies one mile westward of this point, with a sunken rock between them.

North bay, the eastern bay, is divided near its head into three bights by two projecting points. Near the head of the western bight are the old Spanish fort and settlement of San Nicolas. There is good anchorage for small vessels with local knowledge in the western bight, in depths of from 6 to 7 fathoms (11m0 to 12m8), mud.

For the south-western and eastern coasts of Linapacan island, and the islands and dangers off the south-western side of that island, *see* Eastern Archipelago Pilot, Vol. I.

Islands and dangers westward and northward of Linapacan island.—Calibang (Kalibang) island, 650 feet (198m1) high, lies with its north-western end about 4½ miles west-south-westward of the north-western extremity of Linapacan island. Emilia bay lies on the northern side of the island. A rock, awash, lies about 1¼ miles east-south-eastward of the southern extremity of Calibang island, with a coral shoal, with a least depth of 22 feet (6m7) over it, between them. An islet, 75 feet (22m9) high, lies close eastward of the southern end of the island.

Barselisa island, 205 feet (62m5) high, and fringed by a reef, lies about one mile northward of Calibang island, and a rock, awash, lies about the same distance eastward of the northern extremity of Calibang island. Between Calibang island and the western side of Linapacan island there are several islands and shoals, which are described in the Eastern Archipelago Pilot, Vol. I.

Cacayatan (Kakayatan) island, 500 feet (152m4) high, lies about 1¼ miles north-north-eastward of Barselisa island. Condut island, 205 feet (62m5) high, and two islets, 45 and 55 feet (13m7 and 16m8) high, lie on a bank extending south-eastward from the southern extremity of Cacayatan island. Lauauan islet, 156 feet (47m5) high, lies on the reef which extends about a quarter of a mile north-westward from Cacayatan island. Debogso rock, 165 feet (50m3) high, lies 8½ cables south-westward of the northern extremity of Cacayatan island.

Malubutglubut island, partly wooded and partly covered with grass, lies about 1¼ miles north-eastward of Cacayatan island; it is 685 feet (208m8) high, and from northward appears conical. About midway between the two islands is Nanga island, 490 feet (149m3) high. The channel between Malubutglubut island and the north-western extremity of Linapacan island is deep except for a 9-fathom (16m5) patch, with probably less depth, lying about 4 cables eastward of the southern extremity of Malubutglubut island. A strong current, depending on the rate and direction of the wind, will usually be found setting through this channel.

Base rock, about 2½ miles north-north-westward of Malubutglubut island, is 12 feet (3m7) high, and between them are two rocks, 20 and 15 feet (6m1 and 4m6) high, respectively.

Dimanglet island (*Lat. 11° 33′ N., Long. 119° 49′ E.*), 375 feet (114m3) high, lies 1½ miles northward of Bulawan point, the northern extremity of Linapacan island; it may be identified by its two peaks, 375 and 330 feet (114m3 and 100m6) high, respectively, separated by a low neck; the red cliffs of the western and higher peak are prominent from westward.

Charts 3807, 967, 943, 2660b, 2661b, 1263.

Digitized by Google

Chart 3807.

Escucha rock, 80 feet (24^{m}4) high, lies 7 cables northward of the western extremity of Dimanglet island, with a rock, awash, 4 cables north-westward of it. A spit, with a depth of 2¾ fathoms (5^{m}0) over it, extends about a quarter of a mile north-westward and south-eastward from Escucha rock.

Charts 3401, Approaches to Koron bay, 3819.

Linapacan strait. — Islands and dangers. — Linapacan (Linapakan) strait, between the group of islands off the northern end of Linapacan island and Dicabaito (Dikabaito) island, 750 feet (228^{m}6) high, situated 9½ miles north-eastward of Linapacan island, is about 3 miles wide between Dicabaito island and Dicapululan (Dikapululan) island, 375 feet (114^{m}3) high, south-westward of it. An islet, 172 feet (52^{m}4) high, lies close off the south-eastern extremity of Dicabaito island (*Lat. 11° 39′ N., Long. 119° 58′ E.*).

Pangaldauan island, 342 feet (104^{m}2) high, lies 3 miles westward of Dicapululan island. Beacon rocks, 13 feet (4^{m}0) high, lie about one mile northward of Pangaldauan island. A shoal, with a depth of 16 feet (4^{m}9) over it, lies about one mile westward of the island.

Binalabag island, 495 feet (150^{m}9) high, lies about 1½ miles south-eastward of Dicapululan island. Titangcob (Titangkob) island, 250 feet (76^{m}2) high, and fringed by a reef on its northern side, lies about 4 cables westward of Binalabag island.

Linapacan strait is deep and clear of dangers, and the tidal streams have a rate of 3 knots.

There are numerous islands and dangers lying between Binalabag island and Linapacan island, which are described in the Eastern Archipelago Pilot, Vol. I.

Chart 3401, Approaches to Koron bay.

Dicabaito island is separated from the southern end of Culion (Kulion) island, close northward, by Dicabaito (Dikabaito) channel, in which there is sheltered anchorage for vessels with local knowledge, in depths of from 7 to 9 fathoms (12^{m}8 to 16^{m}5).

Charts 3819, 3807.

CALAMIAN GROUP.—The Calamian (Kalamian) group of islands include Busuanga, Coron (Koron), Culion (Kulion) and numerous islets, lying between Linapacan island and Mindoro. The larger islands are generally hilly and the lower slopes and valleys are wooded. There is little cultivation; cattle is the principal export.

The climate of these islands is generally hot and unhealthy, intermittent fevers and cutaneous diseases prevail.

Chart 3819.

Culion island.—Culion is the south-westernmost large island of the Calamian group. It is reserved as a leper colony, and it is unlawful for any vessel to communicate with it without permission from the Chief of the Culion leper colony, Bureau of Health.

Chart 3401, Approaches to Koron bay.

A rock, above water, lies about 1½ cables offshore about half a mile north-westward of the south-western extremity of Culion island. A bank, with a depth of 28 feet (8^{m}5) at its outer edge, extends about half a mile offshore about 1¾ miles northward of the south-western extremity of the island.

Charts 967, 943, 2660b, 2661b, 1263.

Digitized by Google

Chart 3401, Halsey harbour.

Halsey harbour and approach.—Dangers.—Saddle rock (*Lat. 11° 46′ N., Long. 119° 54′ E.*), 114 feet (34m7) high, and fringed by a reef, lies on the western side of a bank about 2 miles westward of the northern entrance point of Halsey harbour. Two rocks, awash, lie on the eastern side of the bank about 4 and 5 cables, respectively, eastward of Saddle rock, and another rock about 1¼ cables southward. When seen from northward or southward, Saddle rock has the appearance of a saddle.

Alava island, 434 feet (132m3) high, lies in the entrance to Halsey harbour, about 2¼ miles south-eastward of Saddle rock; it is fringed by a reef, which from its southern side, extends about 3 cables, with some rocks, 50 and 60 feet (15m2 and 18m3) high, on it. A spit, with a depth of less than 3 fathoms (5m5) over it, extends the same distance north-eastward from the island. Some rocks above water extend about 1½ cables westward from the north-western extremity of the island.

The shores of Halsey harbour are steep, and there are depths of from 14 to 26 fathoms (25m6 to 47m5) in the fairway. South channel, between Alava island and the main island eastward of it, is only one cable wide between the shoals on either side, which, however, are steep-to, and can be plainly seen in a favourable light; there is a least depth of 13 fathoms (23m8) in the fairway of this channel.

Research channel, between the northern point of Alava island and the northern entrance point of the harbour, is three-quarters of a mile wide, but the navigable channel is reduced to half a mile by the shoals extending from either side.

Near its head the harbour branches into North arm and East arm, with several islands between them, the principal of which from west to east are Gage, 296 feet (90m2) high, Iguana, 99 feet (30m2), Alligator, 247 feet (75m3), and an island, 65 feet (19m8), lying close northward of Iguana island. The northern and north-eastern parts of North arm and the whole of East arm are shallow.

Anchorage.—Directions.—Anchorage, protected from all winds, may be obtained anywhere in the middle of Halsey harbour, in depths of from 15 to 18 fathoms (27m4 to 32m9), mud. Small vessels may enter North arm through the narrow channel between Gage and Iguana islands.

A vessel entering by Research channel should keep the summit of Rhodes island (*Lat. 11° 45′ N., Long. 119° 57′ E.*), 438 feet (133m5) high, situated on the southern side of the harbour, about 1½ miles eastward of the northern point of Alava island, bearing 095°, between the two peaks of Mount Maus, about 2 miles eastward, which leads through the middle of the channel; thence she should keep in mid-channel to the anchorage.

Chart 3819.

Radio station.—For radio station at Culion (Kulion), on the north-eastern side of Culion island, *see* Eastern Archipelago Pilot, Vol. I.

Chart 3401, Approaches to Koron bay.

Western side of Culion island.—Dangers.—The west coast of Culion island is steep and rocky; it is fringed by a coral reef extending 4 cables offshore in places from a position about one mile north-westward of the northern entrance point of Halsey harbour to the western

Digitized by Google

Chart 3401, Approaches to Koron bay.

extremity of the island. A bank, with a depth of 25 feet (7m6) over its outer end, extends about three-quarters of a mile north-westward from a point situated about 4¾ miles north-north-westward of the northern entrance point of Halsey harbour. A shoal, with a depth of 31 feet (9m4) over it, lies about 1½ miles north-north-westward of the outer end of this bank. Between this shoal and the western extremity of Culion island there are several off-lying shoals, with depths of from 16 to 31 feet (4m9 to 9m4) over them, lying from about half a mile to 1½ miles offshore, the positions of which may best be seen on the chart.

Islands and dangers north-westward and northward of Culion island.—Galoc (Galok) island, 662 feet (201m8) high, lies close off the north-western extremity of Culion island ; it is fringed by a reef. The channel between the two islands is encumbered with reefs and is not recommended. A rock, above water, lies about 6 cables southward of the south-western extremity of the island.

Popototan island, 345 feet (105m2) high, lies about half a mile northward of the northern part of Galoc island. A spit, with a least depth of 22 feet (6m7) near its outer end, extends about 1¼ miles southwestward from the island, and on the inner part of it is a reef, which dries, with two islets, one of which is 130 feet (39m6) high and the other 84 feet (25m6) high, and a rock, 10 feet (3m0) high, near its outer end. The channel between Galoc and Popototan islands has a least width of about 2 cables between the reefs on either side, and a least depth of 31 feet (9m4) in the fairway. Vessels with local knowledge may obtain a sheltered anchorage in the channel.

A chain of islands including Manganguey (Mangenguei), 171 feet (52m1) high, South Malbinchilao, 295 feet (89m9), North Malbinchilao, 310 feet (94m5), Rat, 156 feet (47m5), Malcatop (Malkatop), 288 feet (87m8), East Malcatop (Malkatop), 128 feet (39m0), Calumbuyan (Kalumbuyan), 225 feet (68m6), Dicoyan (Dikoyan), 215 feet (65m5) and Tantangon, 168 feet (51m2), extends about 5½ miles north-eastward from a position about three-quarters of a mile northward of the eastern end of Popototan island. The islands and dangers between the northeastern side of Culion island and the southern side of Busuanga are described in the Eastern Archipelago Pilot, Vol. I.

West Nalaut island, the westernmost of the Calamian group, 235 feet (71m6) high, lies about 4 miles north-westward of Popototan island ; it is fringed by a coral reef. The eastern part of the island is a low, wooded sand-spit, and the western part is rocky ; the island is uninhabited.

Chart 3807.

A shoal, with a depth of 27 feet (8m2) over it, lies 1½ miles west-north-westward of West Nalaut island, and a shoal, with a depth of 28 feet (8m5) over it, lies 3¼ miles north-north-westward of the same island.

Chart 3401, Approaches to Koron bay.

East Nalaut island, 114 feet (34m7) high, with two peaks of nearly equal elevation, lies about 2½ miles north-eastward of West Nalaut island. Two shoals, with depths of 31 and 34 feet (9m4 and 10m4) over them, lie 4½ cables south-eastward and 7 cables east-south-eastward, respectively, of East Nalaut island.

Maltatayoc (Maltatayok) island (*Lat. 12° 03′ N., Long. 119° 55′ E.*), 220 feet (67m1) high, lies about 4 miles eastward of West Nalaut island ;

Charts 967, 943, 2660b, 2661b, 1263.

Digitized by Google

Chart 3401, Approaches to Koron bay.

it is fringed by a reef, and a bank, with depths of from 3 to 6 fathoms (5m5 to 11m0) over it, extends 4½ cables north-westward from the western extremity of the island. South cay, 70 feet (21m3) high, and North cay, 66 feet (20m1) high to the tops of the trees, lie about 6 and 11 cables, respectively, northward of the eastern end of Maltatayoc island; the two cays are connected by a reef, with a depth of 4 feet (1m2) over it.

Horse island, 245 feet (74m7) high, lies 6½ cables eastward of Maltatayoc island; an island 215 feet (65m5) high, lies on the reef which fringes Horse island, about one cable northward; a reef, awash, lies about 4½ cables farther northward, and another reef, awash, lies about midway between Maltatayoc island and the northern end of Horse island. A bank, with a depth of 3 fathoms (5m5) over its outer end, extends about one mile westward from the southern extremity of Horse island (*Lat. 12° 03′ N., Long. 119° 54′ E.*).

Pamalican (Pamalikan) islands, the largest of which is 70 feet (21m3) high to the tops of the trees, lie about 2¼ miles east-north-eastward of East Nalaut island; foul ground lies within 7 cables westward and within the same distance northward of the largest island; a rock, 14 feet (4m3) high, lies at the southern end of the foul ground, 3½ cables northward of the island. A reef, awash, and a one-fathom (1m8) patch lie about one mile eastward and east-south-eastward, respectively, of the largest island; a 10-foot (3m0) patch lies about 3½ cables south-eastward of the same island.

Charts 3819, 3807.

Busuanga.—Busuanga, the northernmost of the larger islands, of the Calamian group, lies north-eastward of Culion, from which it is separated by a strait in which are numerous islands and shoals. There is a deep channel through the strait with a least width of about half a mile at its western end. Mount Tundalara, 2,140 feet (652m3) high, near the south-eastern end of the island, is the greatest elevation.

West coast of Busuanga.—Between the south-western point of Busuanga and the eastern entrance point of Gutob bay, about 12½ miles north-westward, are the towns of Concepcion, Salvacion, and Busuanga, situated about 2½, 8 and 9½ miles, respectively, from the former point. At Concepcion there is a church with a galvanized iron roof, which is prominent. At Salvacion the roof of the school is noticeable from south-westward. At Busuanga there is a small stone pier, available to boats, on the bank of Busuanga river, about 4 cables from the entrance. The mouth of the river is closed by a bar, which boats have difficulty in crossing at low water. Salvacion island, 155 feet (47m2) high, lies half a mile offshore westward of the town of the same name, and a reef, awash, lies 6½ cables south-westward of Salvacion island.

Chart 3807.

Gutob bay and approaches.—Dangers.—Gutob bay, entered between a point about 1¼ miles north-westward of the town of Busuanga, and Detobet point, about 3 miles west-south-westward, is encumbered with islands and shoals. Malajon (Malahon) island, 779 feet (237m4) high, barren and steep-to, lies 2 miles westward of Detobet point. Talampulan island, 418 feet (127m4) high, and fringed by a reef which extends about 3½ cables north-north-westward, lies about one mile south-south-westward of Detobet point. A rock, 65 feet (19m8) high, lies on the fringing reef, about 1¾ cables from the middle of the

Digitized by Google

Chart 3807.

western side of Talampulan island. An island, 327 feet (99m7) high, lies 3½ cables southward of Talampulan island.

In the entrance to the bay are Capare island, 550 feet (167m6) high, with its northern extremity situated about 1¾ miles north-eastward of Detobet point; Manolebeng island, 204 feet (62m2) high, half a mile eastward of the southern part of Capare island; Manolaba island, 149 feet (45m4) high, close eastward of the northern part of the same island and connected to it by a reef, and Bacbac island, 336 feet (102m4) high, 3 cables north-eastward of the northern extremity of Capare island.

There are numerous reefs awash and other dangers between Capare island (*Lat. 12° 08′ N., Long. 119° 52′ E.*) and the coast of Busuanga eastward, and between the southern end of Capare island and Talampulan island.

The best entrance to Gutob bay for vessels with local knowledge is between Detobet point and the northern end of Talampulan island, keeping nearer the former to avoid the reef which extends about 3½ cables north-north-westward from the northern end of the island, thence between the land northward of Detobet point and the western side of Capare island, which passage leads to the best anchorage in the bay between Bacbac island and the coast of the peninsula westward of it, in depths of from 7 to 11 fathoms (12m8 to 20m1), well protected from all winds.

Coast.—The west coast of Busuanga between Detobet point and Macachin point, the northern extremity of the island, about 11 miles northward, is indented and fringed with reefs.

Buluang village is situated in a small bight about 5 miles northward of Detobet point. Small craft with local knowledge can anchor in a break in the coastal reef abreast the village, but this anchorage is open westward.

Kalampisauan and Elet islands, 380 and 288 feet (115m8 and 87m8) high, respectively, lie close offshore, about 5¼ and 6 miles northward of Detobet point.

Illultuk bay is entered about 2½ miles southward of Elinibinid point, the north-western point of the island, situated about 10 miles northward of Detobet point; it affords good anchorage to vessels with local knowledge, in depths of from 6 to 7 fathoms (11m0 to 12m8), eastward of a point on the southern shore about 1¼ miles from the entrance. An islet, 121 feet (36m9) high, lies close northward of the southern entrance point to which it is joined by a reef.

The coast between the entrance to Illultuk bay and Macachin point is fringed by a reef which, in places, extends as much as half a mile offshore. A 5-fathom (9m1) patch lies about 1¾ miles south-westward of Elinibinid point and 1½ miles offshore.

Off-lying dangers.—Pinnacle rock, 43 feet (13m1) high, lies about 1¼ miles north-westward of Elinibinid point, and midway between the rock and the coast eastward is a shoal, with a least depth of 3 fathoms (5m5) over it. A bank, with depths of from 6 to 8 fathoms (11m0 to 14m6) over it, lies about 1¼ miles south-westward of Pinnacle rock.

Lena shoal, with a least depth of 4¼ fathoms (7m8) over it, lies about 6 miles west-north-westward of Elinibinid point.

Within 20 miles westward of the Calamian group, and about 16 miles northward of its north-western end, the depths are very irregular and

Digitized by Google

Chart 3807.

there are a number of shoals and banks ; a good lookout should be kept when navigating in this locality. The positions of these dangers can best be seen on the chart.

Islands and dangers northward of Busuanga.—Northwest rock (*Lat. 12° 25′ N., Long. 119° 53′ E.*), 127 feet (38m7) high, with a flat summit, barren and of dark appearance, lies 4¾ miles northward of Macachin point.

Chart 3819.

Dimipac (Dimipak) island, 439 feet (133m8) high, and wooded, lies about 1¾ miles northward of Macachin point ; it is fringed by a reef over the greater part, extending about half a cable offshore. Sail rocks, a group of bare rocks, 109 feet (33m2) high, lie about three-quarters of a mile northward of Dimipac island. A bank, with a depth of 45 feet (13m7) over it, lies about 1½ miles north-eastward of Sail rocks.

Tanobon island, 263 feet (80m2) high, and wooded, lies 2 miles north-eastward of Inagtapan point, situated 2 miles east-south-eastward of Macachin point ; it is fringed by a reef, and a bank, on which there are some rocks, 22 feet (6m7) high, extends three-quarters of a mile north-eastward from the island. Two rocks, 4 feet (1m2) high, lie about one mile west-north-westward of the south-western extremity of the island. The depths in this vicinity are irregular.

MINDORO STRAIT.—This wide strait, separating the Calamian group from Mindoro, is frequently used by steam vessels trading between Manila and the southern islands and Palawan. It is divided into two passes by Apo island and reef.

Apo island.—Light.—Apo island lies near the middle of Mindoro strait about 36 miles north-eastward of Macachin point, Busuanga. The island is low and wooded, and has white sandy beaches on its eastern and southern sides ; it is fringed by a reef which extends half a mile off in places. There is no good anchorage off the island. The island is separated from Apo reef, eastward of it, by a deep channel about one mile wide.

A light is exhibited, at an elevation of 130 feet (39m6), from a black steel tower, with a white lantern, on the north-eastern side of Apo island.

Apo West pass.—Islands and dangers.—Apo West pass, between the north-eastern islands of the Calamian group and Apo island and reef, is about 20 miles wide.

Colocoto (Kolokoto) rocks are four precipitous black rocks, the highest of which has an elevation of 214 feet (65m2), situated on the south-western side of Apo West pass, about 9 miles north-eastward of Dimipac island. A shoal, with a depth of 46 feet (14m0) over it, lies about 2 miles south-westward of Colocoto rocks.

Dumunpalit island, 297 feet (90m5) high, and wooded, with several rocks, above water, lying on the same steep-to reef, lies about 6¾ miles south-eastward of Colocoto rocks.

Nanga islands are two wooded islands, 248 and 173 feet (75m6 and 52m7) high, lying on a reef on which there are some rocks above water, situated 8½ miles east-south-eastward of Dumunpalit island. A rock, 95 feet (29m0) high, and steep-to, lies one mile north-eastward of the northern island. Several patches, with depths of 8 and 9 fathoms

Digitized by Google

Chart 3819.

(14m6 and 16m5) over them, lie between Dumunpalit and Nanga islands.

Camanga (Kamanga) island, 213 feet (64m9) high, with several small rocky islets near it, lies about 2 miles south-south-westward of the southern of the Nanga islands. The westernmost rocky islet is 90 feet (27m4) high and bold. Nanga and Camanga islands are uninhabited.

Tara island, 477 feet (145m4) high, lies about 4½ miles south-eastward of the Nanga islands ; the upper slopes of the hills are bare of trees and of a brown colour, but in the rainy season have a distinct greenish tint ; the lower slopes and valleys are covered with jungle.

A reef extends about 7 cables north-north-westward and westward from the north-western end of the island. The western side of the island is bordered mostly by a sandy beach with a wide coral reef and there are several off-lying rocks, above and below water. The eastern side is mostly rocky with steep bluffs. A good anchorage may be obtained off the village on the western side, in a depth of 17 fathoms (31m1). There is a small stone pier in a break of the reef, which is a good landing place.

A shoal, with a depth of 33 feet (10m1) over it, lies about 1½ miles northward of Tara island (*Lat. 12° 17′ N., Long. 120° 21′ E.*).

Lagat, Bantac (Bantak) and Calanhayaun (Kalanhayaun) islands, lying southward of Tara island, are wooded and dark in colour. Lagat island, 261 feet (79m5) high, is very steep and has nearly bare eroded cliffs which show red or yellow through the sparse vegetation. A coral reef extends about 3 cables south-eastward from the south-eastern extremity of the island, and a detached reef, with a depth of 7 feet (2m1) over it, lies about three-quarters of a mile north-westward of the island.

Bantac island, 396 feet (120m7) high, and Calanhayaun island, 248 feet (75m6) high, southward of it, are connected by a coral reef. Two detached rocks, 40 and 59 feet (12m2 and 18m0) high, respectively, lie about 3 and 1½ cables off the western side of Bantac island, and a rocky islet, 30 feet (9m1) high, lies about 7 cables westward of Calanhayaun island.

A bank, on which there is a rock, 15 feet (4m6) high, and a depth of 7 fathoms (12m8) at its outer end, extends about 8 cables north-north-westward from the northern end of Bantac island, and a spit, with a depth of 1½ fathoms (2m7) over it, extends about 2 cables southward from the southern extremity.

Lubutglubut island, 366 feet (111m6) high, and some brown rocks, 163 feet (49m7) high, both barren, lie about 8 cables south-westward and 2 miles south-south-westward, respectively, of the southern extremity of Calanhayaun island.

A shoal, with a depth of 6 fathoms (11m0) over it, was reported, in 1950, to lie about 7 miles north-eastward of the northern of the Nanga islands.

Hunter rock, with a depth of 7 feet (2m1) over it, and on which the sea breaks, is steep-to, and lies about 13½ miles westward of Apo island.

Merope rock, with a least depth of 14 feet (4m3) over it, and on which the sea breaks, is steep-to, and lies about 10 miles west-north-westward of Apo island.

Apo East pass.—Dangers.—Bank.—Apo East pass, between Apo

Digitized by Google

Chart 3819.

reef and the western side of Mindoro, is 15 miles wide, and with the exception of Discovery bank, is deep and clear of dangers. This bank, which has a depth of 9 fathoms (16m5) over it, lies about 14½ miles eastward of Apo island lighthouse; the sea does not break on the bank, nor is it marked by discoloration.

Apo reef is an extensive danger in which there are two shallow lagoons, separated by a channel entered from westward. In the northern lagoon are the Cayos del Bajo, consisting of two rocks, 8 and 20 feet (2m4 and 6m1) high, respectively, and numerous coral heads, awash, with depths of from one to 3 fathoms (1m8 to 5m5), sand, between them. There are numerous rocks, which dry, especially along the northern side of the reef, and there are some rocks above water towards the eastern edge. The wreck of a steamer lies on the northern extremity of the reef and is a useful mark. The whole of the reef is steep-to. The southern lagoon lies eastward of Apo island, and Menor islet (*Lat. 12° 40′ N., Long. 120° 26′ E.*), about 25 feet (7m6) high and wooded, lies at the north-western extremity of the southern lagoon. Vessels with local knowledge may obtain anchorage, in a depth of about 15 fathoms (27m4), in the channel between the lagoons, about 2 miles eastward of Menor islet.

Directions.—Vessels navigating Apo East pass should, both by day and by night, pass about 4 miles westward of Cape Calavite (page 212), thence about the same distance off Pandan islands and Dongon point, thence 1¾ miles westward of Ambulong island, situated near the southern extremity of Mindoro. Apo reef should be avoided, as it does not always break, and soundings give no warning of its vicinity.

Current.—The set of the current in Mindoro strait depends chiefly on the prevailing wind; a current setting south-eastward at the rate of about half a knot has been observed.

Charts 3819, 3807.

MINDORO.—The island of Mindoro lies about 7 miles southward of the south-western part of Luzon; it is sparsely populated, little known and developed, being extremely mountainous, covered with dense forests, and in the more level parts near the coast full of marshes and consequently unhealthy. The inhabitants of the coast are Tagals, but in the interior there is a tribe, probably the aborigines of the island, called Manguianes, speaking a peculiar language and living in a very primitive manner on the products of a rude agriculture.

Mount Halcon, about 42 miles east-south-eastward of Cape Calavite (Kalavite), the north-western point of Mindoro, is 8,481 feet (2,585m0) high, and is one of the highest mountains in the northern Philippines.

Western side of Mindoro.—Coast.—The western coast of Mindoro is generally bold, the only important danger being Mamburao reef, about 24 miles south-eastward of Cape Calavite. With this exception all dangers may be avoided by giving the coast a berth of at least 2 miles. There are no harbours or anchorages on this coast that afford shelter in all winds. The beach is generally low and sandy, and the land rises gradually to the mountain range inland.

Chart 3819.

Dongon point, 52 miles south-south-eastward of Cape Calavite, is

Digitized by Google

Chart 3819.

low and sandy. There is anchorage for vessels with local knowledge, protected from northerly and easterly winds, in Dongon bay, about 2 miles eastward of Dongon point.

Between Dongon point and Sablayan point, about 6¾ miles north-north-westward, there are a few reefs lying within three-quarters of a mile of the coast.

Sablayan anchorage.—Dangers.—Sablayan point is the termination of a small peninsula extending about half a mile south-westward and on which there is a wooded knoll, 120 feet (36m6) high. A coral reef, which dries, fringes the point, and extends about 1½ cables offshore. The peninsula forms the western side of a bay about three-quarters of a mile wide at its entrance, but this is considerably reduced by reefs on both sides, and the northern part is encumbered by reefs which enclose a small lagoon, with depths of from 4 to 5 fathoms (7m3 to 9m1), to which there is a narrow entrance. There are many rocks above water in the northern part of the bay, and sunken rocks lie within about 3½ cables of the shore in the southern part.

The town of Sablayan is situated on the western side of the bay; the church, in the southern part of the town, at the foot of the wooded knoll, is partly obscured by coconut trees. Landing by ships' boats is almost impossible at low water in front of the town on account of the numerous coral heads; at this state of the tide landing can be effected at the mouth of the river at the head of the bay, where there is a break in the shore reef.

Anchorage may be obtained, in a depth of 16 fathoms (29m3), rock, about 2½ cables from the church, with Sablayan point (*Lat. 12° 50′ N., Long. 120° 46′ E.*) bearing 270°. Vessels should not bring Sablayan point to bear less than 270°, as the bottom is rocky and uneven, and the depths decrease rapidly towards the reefs. Small craft with local knowledge can anchor about 3¾ cables eastward of the church, or can enter the lagoon.

Coast.—Dangers.—Pandan islands are two islands, the northern of which is 150 feet (45m7) high and the southern, 100 feet (30m5), and both densely wooded, lying from about three-quarters of a mile to 2 miles north-westward of Sablayan point. The channel between the islands is clear of dangers, but that between the southern island and the point is foul.

Pandan bay lies between the Pandan islands and the main island eastward of them. A coral reef, with a depth of 13 feet (4m0) over it, lies about 1¼ cables north-eastward of the north-eastern point of the southern island; two reefs, with depths of 7 and 27 feet (2m1 and 8m2) over them, lie about 6 cables eastward and 4½ cables north-eastward, respectively, of the same point.

Anchorage may be obtained in the southern part of Pandan bay, with good protection during the South-west monsoon, in depths of from 7 to 14 fathoms (12m8 to 25m6), mud, about a quarter of a mile from the north-eastern side of the southern Pandan island.

Charts 3819, 3807.

Between Sablayan point and Tubile (Tubili) point, about 28 miles north-north-westward, the coast is generally low with a sandy beach. A rock, with a depth of 3 feet (0m9) over it, lies about half a mile offshore and 5 miles north-north-westward of Talabasi point, situated 14 miles northward of Sablayan point.

Charts 943, 2661b, 1263.

Digitized by Google

Chart 3816.

Mamburao reef, awash near its northern end, lies with its outer edge about 3 miles southward of Carauisan (Karauisan) point, situated 10½ miles north-westward of Talabasi point. A reef, with a sunken rock near its outer end, extends about 1¼ miles south-south-westward from Carauisan point, and two 16-foot (4m9) patches lie about one mile westward and south-westward, respectively, of the same point. A rock, with a depth of 3 feet (0m9) over it, lies about 1¾ miles southward of the point.

Mamburao bay is entered between Mamburao reef and Tubile point, the termination of a densely wooded, prominent peninsula, connected to the mainland by a low isthmus, situated about 4½ miles north-westward. A reef, over which there is a depth of 16 feet (4m9), extends about half a mile southward from Tubile point. Mamburao river discharges into Mamburao bay, about 3¾ miles eastward of Tubile point; depths of from 2 to 3 feet (0m6 to 0m9) can be carried over the bar at the river entrance at low water. The village of Mamburao stands on the eastern side of the entrance to the river; the galvanized iron roof of the school building is visible about 4 miles.

Good anchorage may be obtained by vessels with local knowledge, except during the South-west monsoon, in a depth of 5 fathoms (9m1), mud and sand, about half a mile south-westward of Mamburao village. Vessels approaching this anchorage should keep the village bearing between 024° and 067° to avoid the foul ground extending from the northern shore of the bay westward, and Mamburao reef eastward.

Igsoso bay is entered between Tubile point (*Lat. 13° 14′ N., Long. 120° 31′ E.*) and Igsoso point, about 2¾ miles north-north-westward. Binarera point, about 2½ miles north-north-westward of Igsoso point, is high, rocky and steep-to. Camtas (Kamtas) point lies 4¼ miles northward of Binarera point. A 4-fathom (7m3) patch lies about 2½ miles north-north-westward of Binarera point, and two patches, with depths of 8 and 9 fathoms (14m6 and 16m5) over them, lie about 1¼ miles west-south-westward and the same distance south-south-westward, respectively, of Camtas point.

Paluan bay.—Paluan bay, entered between Camtas point and Pantocomi (Pantokomi) point, about 4¾ miles westward, affords good shelter during the North-east monsoon. The entrance points are each fringed by a reef which dries, extending about a quarter of a mile offshore.

Shoal water was reported, in 1945, to be extending southward from Pantocomi point.

The town of Paluan is situated on the southern side, and Lipa village on the northern side of the entrance to Paluan river, which discharges into the north-eastern side of the bay.

Anchorage.—The best anchorage is, in a depth of 14 fathoms (25m6), black mud, about 1½ miles westward of the northern entrance point of Paluan river. A more convenient anchorage may be obtained with Paluan church, bearing 100°, in depths of from 7 to 12 fathoms (12m8 to 21m9), mud. A fairly protected anchorage may be obtained during the South-west monsoon, in a depth of 14 fathoms (25m6), mud, in Pamutusin cove, on the western side of Paluan bay. Sudden squalls sometimes blow violently off the high land, and at night give no warning.

Coast.—Light.—Between Pantocomi point and Cape Calavite,

Digitized by Google

Chart 3816.

6¾ miles north-westward, there are a few rocks interspersed along the coast, but they lie close offshore, and all dangers may be avoided by giving this coast a berth of over one mile.

Aro point lies about 2½ miles westward of Pantocomi point.

Mount Calavite (Kalavite) is a large promontory, the western slope of which terminates in Cape Calavite and the northern slope in Del Monte point; the summit of the mountain is 4,990 feet (1,520m9) high, and appears dome shaped from westward, but from northward or southward it shows a long ridge, fairly level, and highest at its western end.

A light (*Lat. 13° 27′ N., Long. 120° 18′ E.*) is exhibited, at an elevation of 137 feet (41m8), from a white circular steel tower, on Cape Calavite.

LUBANG ISLANDS.—Lubang islands are a group of six islands which lie off the north-western end of Mindoro and the south-western end of Luzon. The only safe anchorage for vessels during all seasons is at Port Tilig, on the northern side of Lubang island.

Golo island.—Light.—Golo island is 956 feet (291m4) high near its eastern end, which lies about 6 miles northward of Del Monte point. H.M.S. *Teazer*, in 1872, anchored, in a depth of 13 fathoms (23m8), mud, off the southern side of the island, with Cape Calavite bearing 189°, and the southern side of Golo island 115°; about a quarter of a cable inshore of this position depths of 4 and 5 fathoms (7m3 and 9m1), coral, were observed.

A light is exhibited, at an elevation of 186 feet (56m7), from a concrete tower, situated near the south-eastern extremity of Golo island.

Lubang island.—Lubang island, the largest and most important of the group, attains an elevation of 1,967 feet (599m5) near the middle, but is low at either end. It is separated from Golo island by Golo pass, a channel about 3 cables wide between the reefs on either side, but is encumbered in the middle by some rocks, nearly awash. The coasts of the island are fringed by reefs which extend about a quarter of a mile offshore in places; the south-western side is rocky. On the north-eastern and eastern sides are several bays, more or less protected but difficult to enter on account of the shoals and reefs by which they are encumbered. When approaching from southward the north-western extremity of the high land may be mistaken for the end of the island.

South-west coast.—Anchorages.—Vessels with local knowledge can anchor, with shelter from north-easterly winds, in Tabajin (Tabahin) bay on the southern side of Lubang, about 2½ miles north-westward of Manog point, the southern extremity of the island. Landing can be effected on a sandy beach at the head of the bay. A 27-foot (8m2) patch lies in the north-western part of the bay, 4 cables offshore.

Gontin bay lies between Yapusan point, about 4 miles north-westward of Manog point, and Gontin point, 2¾ miles farther in the same direction. A 6-fathom (11m0) patch lies close outside the entrance, about three-quarters of a mile south-eastward of Gontin point.

A good sheltered anchorage during the North-east monsoon can be obtained by vessels with local knowledge in Tagbac (Tagbak) cove, near the north-western end of Lubang island on the south-western side, in a depth of 15 fathoms (27m4), in a break in the reefs; the land in

Digitized by Google

Chart 3816.

the vicinity is low and there are no prominent landmarks, but no difficulty will be found in picking up an anchorage.

North-east coast.—Lubang, the principal town in the island, is situated on the edge of a fertile plain, about 2 miles eastward of Sala point, the north-western extremity of the island ; it contains a prominent church. Landing is difficult in front of the town on account of the coral reef which fringes the coast, but there is a break in the fringing reef westward of the church, through which small boats can pass in fine weather at certain stages of the tide. There is no good anchorage off the town.

Vessels wishing to communicate with Lubang town should steer for the church, bearing 166°, until the south-western point of Ambil island (*see* below) is in line with the next point eastward of Port Tilig, bearing about 122°, when they will be about 1½ miles offshore.

Port Tilig (*Lat. 13° 49′ N., Long. 120° 12′ E.*), entered about 5 miles east-south-eastward of Lubang, is sheltered from all winds, and is completely protected from the sea ; the holding ground is good, but the anchorage is only available for small vessels with local knowledge. The entrance, in which there are depths of from 10 to 14 fathoms (18m3 to 25m6) in mid-channel, is open north-north-westward. A reef, which dries, divides the head of the port into two small but good anchorages. The western shore can be approached until the anchorage off the western entrance point is reached, where there are depths of from 3½ to 5 fathoms (6m4 to 9m1), mud and sand.

Off-lying danger.—Afuera shoal, with a least depth of 7 feet (2m1) over it, lies about 2½ miles northward of the western entrance point of Port Tilig. The northern extremity of Ambil island in line with the southern extremity of Mandaui island, bearing 097°, leads southward of the shoal.

Looc bay.—Looc (Look) bay is entered between Tumbaga point, about 7 miles south-eastward of Port Tilig, and Pauican (Pauikan) point, about 1½ miles southward ; it affords safe anchorage to vessels with local knowledge, the inner anchorage near the head of the bay being somewhat protected from easterly winds by the reefs in the middle. A spit, with a depth of 26 feet (7m9) at its outer end, extends about 3 cables south-eastward from Tumbaga point. A bank, with depths of from 12 to 24 feet (3m7 to 7m3) over it, extends about 6 cables northward from Pauican point, and a bank, with depths of from 9 to 30 feet (2m7 to 9m1) over it, extends about 4½ cables north-eastward from the same point. Talinas islet lies on the reef which extends about 3½ cables eastward from Pauican point.

There is good holding ground just inside the entrance to Looc bay, in depths of from 10 to 20 fathoms (18m3 to 36m6). Farther in the depths decrease suddenly, and several coral reefs encumber the bay and prevent direct access to its head. Good shelter, however, may be obtained between these reefs. The village of Looc (Look) is situated near the head of the bay.

Off-lying dangers.—A shoal, with a depth of 21 feet (6m4) over it, lies about 4 miles eastward of Pauican point. Two 7-fathom (12m8) patches lie about 2 miles north-eastward and about 1½ miles south-eastward, respectively, of Talinas islet.

Islands and dangers north-eastward of Lubang island.—Ambil island, separated from the north-eastern side of Lubang island

Digitized by Google

Chart 3816.

by a channel about one mile wide, is formed by a conical mountain, 2,502 feet (762m6) high. The north-eastern side of the island is high and rocky, with an open bay, in which there are depths of from 10 to 12 fathoms (18m3 to 21m9), shoaling to 5 fathoms (9m1) near the fringing reef. The western side of the island is fringed with coral. The anchorage in the bay on the southern side of the western point of the island is considerably restricted by reefs which extend 3 cables offshore; a 15-foot (4m6) patch lies nearly in the middle of the bay, leaving little room for anchorage.

The channel between Ambil and Lubang islands is contracted to a width of about 6½ cables by the fringing reefs on either side. There is a least depth of 27 feet (8m2) in the fairway; a patch with a depth of 40 feet (12m2) over it, lies about 1½ miles west-south-westward of Antucao (Antukao) point (*Lat. 13° 47′ N., Long. 120° 19′ E.*), the southern extremity of Ambil island.

Shoals, with depths of less than 6 fathoms (11m0) over them, extend about 3 miles from the north-western side of Ambil island. Ambil shoal, with a least depth of 21 feet (6m4) over it, lies about 1¼ miles northward of the western point of the island, and two 22-foot (6m7) patches lie, respectively, about half a mile west-north-westward and the same distance northward of that point. Vessels drawing more than 18 feet (5m5) should not attempt to pass between Ambil shoal and Ambil island.

An extensive bank, with a least depth of 28 feet (8m5) over its northern edge, lies about 4 miles northward of Ambil island; on other parts of the bank there are depths of from 34 to 48 feet (10m4 to 14m6).

Mandaui island, 275 feet (83m8) high, lies about 7 cables north-north-eastward of Mahaba point, the north-eastern extremity of Ambil island; the north-eastern side of the island is steep-to, and a reef, with shoal water outside it, extends about one cable from the south-western side. The channel between Mandaui and Ambil islands is 3 cables wide between the 5-fathom (9m1) lines, with a least depth of 31 feet (9m4) in the fairway.

Malavatuan island, 248 feet (75m6) high, and covered with brushwood, lies about 1½ miles north-north-eastward of Mandaui island with a deep passage between. A bank, with a depth of 6 fathoms (11m0) at its outer end, extends half a mile north-westward from Malavatuan island, and a 37-foot (11m3) patch lies about 4 cables farther in the same direction. Two banks, each with a least depth of 7 fathoms (12m8) over it, lie about 1¾ miles north-eastward and 3¾ miles north-north-eastward, respectively, of Malavatuan island.

Cabra island.—Light.—The channel between Lubang island and Cabra island, the north-western island of the group, is about 1½ miles wide, and deep in the fairway. The reef fringing the north-western end of Lubang is always visible, and the south-eastern side of Cabra island is steep-to.

Cabra island is flat-topped, wooded, and about 200 feet (61m0) high. A reef extends about half a cable from the northern and north-eastern sides of the island.

A light is exhibited, at an elevation of 216 feet (65m8), from a white square tower on a white dwelling near the western extremity of Cabra island. *See* view facing page 42.

Charts 3807, 943, 2661b, 1263.

Digitized by Google

CHAPTER X

WEST COAST OF LUZON FROM CAPE SANTIAGO TO MANILA, INCLUDING MANILA BAY

Chart 1263.

LUZON.—Luzon, the largest of the Philippine islands, is mountainous with ranges trending generally parallel with the western coast. Northward of Lat. 16° N. there are two ranges, separated by the great valley of Cagayan river ; the eastern range, known as the Sierra Madre, is continuous and lofty, its eastern side sloping to a bold, almost inaccessible, coastline. There are several isolated volcanic peaks in the southern part of the island.

Climate and weather.—*See* page 22.

Chart 3816.

WESTERN SIDE OF LUZON. — Coast. — Light. — Dangers. —Cape Santiago (*Lat. 13° 46′ N., Long. 120° 39′ E.*), the south-western extremity of Luzon, is from 300 to 380 feet (91^{m}4 to 115^{m}8) high, and wooded ; it is fringed by a reef, which dries, and extends as much as one cable offshore.

Between Cape Santiago and Calatagan (Kalatagan) point, about 3½ miles north-westward, the land is higher than farther northward, the fringing reef is very narrow and steep-to, and there are no detached dangers. Northward of Calatagan point the coast is low, sandy and covered with mangroves ; it is indented by several estuaries. Between this point and Talin point, about 10 miles northward, the coast is fringed by a reef, which dries, extending in places about 1¼ miles offshore. There are numerous shoals, with depths of from 9 to 42 feet (2^{m}7 to 12^{m}8) over them, lying from about half a mile to 2½ miles offshore, the positions of which may best be seen on the chart.

A light is exhibited, at an elevation of 89 feet (27^{m}1), from a white circular tower, with a white dwelling, about 4 cables north-westward of the southern extremity of Cape Santiago. *See* view facing page 42.

Caution.—The channel between the south-western coast of Luzon and the Lubang islands is subject at times to heavy offshore squalls between the hours of 0400 and 1000. *See* also " Squalls " under " Climate and weather " on page 22.

Coast. — Light. — Dangers. — Buoy. — Talin point is the northern termination of a small peninsula which consists of sparsely wooded pyramidal hills rising to an elevation of 280 feet (85^{m}3) about three-quarters of a mile south-south-eastward of the point. The point is fringed by a reef about one cable wide, and a spit, with depths of less

Digitized by Google

Chart 3816.

than 3 fathoms (5m5) over it, extends about half a mile north-north-westward.

Talin bay, entered between Talin point and San Diego point, about 3¼ miles northward, is open north-westward and is foul; its shores consist of alternate rocky cliffs and sandy beaches. Between San Diego point and Nasugbu point, about 3 miles northward, the coast which forms Nasugbu bay, is low, sandy, wooded and steep-to. Lian and Wawa rivers, each of which has a bar, with depths of less than 2 feet (0m6) over it, discharge about 2 miles northward of San Diego point, and close eastward of Nasugbu point, respectively.

A light is exhibited, at an elevation of 36 feet (11m0), from a white concrete pillar, on the eastern side of the entrance to Wawa river.

Pillar rock, a prominent pinnacle rock, 25 feet (7m6) high, lies about half a cable westward of Nasugbu point; a rocky shoal, with a least depth of 1¾ feet (0m5) over it, marked on its south-eastern side by a black can buoy, lies about half a mile offshore and 4 cables southward of Pillar rock, and a rock, awash, is situated about 3 cables north-north-westward of that rock.

There is good anchorage during the North-east monsoon, in depths of 6 or 7 fathoms (11m0 or 12m8), about half a mile offshore, southward and eastward of the rocky shoal described above. Small vessels, with local knowledge, can anchor between the shoal and Nasugbu point (*Lat. 14° 05′ N., Long. 120° 37′ E.*).

The town of Nasugbu stands about a quarter of a mile inland between the mouths of the Lian and Wawa rivers. There is occasional steamer communication with Manila.

Off-lying island and dangers.—Light.—Fortune island, 390 feet (118m9) high, partially wooded and steep-to, lies about 7½ miles west-south-westward of Nasugbu point.

A light is exhibited, at an elevation of 415 feet (126m5), from a white concrete pillar on the summit of Fortune island.

Simo banks are four banks lying westward of Fortune island. The westernmost bank, with a least depth of 6 fathoms (11m0) over it, near its western end, lies about 12½ miles westward of the island. About 3¾ miles eastward of the shoalest spot of the westernmost bank is a 40-foot (12m2) patch; the two eastern banks have least depths of 15 fathoms (27m4) over them.

Coast.—Dangers.—The coast northward of Nasugbu point is high and wooded. Fuego point, about 4¼ miles north-westward of Nasugbu point, is 70 feet (21m3) high, and rocky. Two islets, the northern of which is 93 feet (28m3) high, lie close northward of the point.

Two small islets, 35 feet (10m7) high, covered with grass, and connected by a reef, with a depth of 2 feet (0m6) over it, lie about 1¼ miles south-south-eastward of Fuego point; some rocks, awash, lie about 3 cables north-eastward of the larger islet. A 27-foot (8m2) patch lies about 2 cables southward of the southern islet.

Between Fuego point and Limit point, 5¾ miles northward, the coast is high, rocky and steep-to, with several small islets close offshore; it is indented by several small coves, all of which afford shelter, except from westerly winds, to small vessels with local knowledge.

Between Fuego point and Hamilo point, about 2¼ miles northward, the coast forms three bays. About midway between these points

Digitized by Google

Chart 3816.

there are two small islets, each 90 feet (27m4) high. The channel between these islets and the mainland east-south-eastward is foul. Looc (Look) cove, the middle of the three, is entered close northward of the islets mentioned above; the shores of this bay are steep-to, except at its head where there is a sandy beach backed by trees.

Hamilo point is 360 feet (109m7) high; an islet, 120 feet (36m6) high, lies close westward of it. Hamilo cove is entered between Hamilo point and a small islet, 97 feet (29m6) high, about 2 cables offshore, about 1¼ miles northward.

Some prominent pinnacle rocks lie on the outer end of a spit extending about 1½ cables from the southern shore of Hamilo cove, about three-quarters of a mile east-north-eastward of the extremity of Hamilo point. At the head of the cove there is a basin, about a quarter of a mile wide at the entrance, which affords good shelter to vessels with local knowledge; the head of the basin is shoal and fringed with mangroves. The best anchorage is, in depths of from 6 to 8 fathoms (11m0 to 14m6), mud, in the northern part of the basin.

Chart 976.

Campanario island, 110 feet (33m5) high, lies close offshore, about 2 miles south-south-westward of Limit point.

Limit point, the southern entrance point of Manila bay, is 220 feet (67m1) high, rocky and steep-to.

MANILA BAY. — Entrance. — Dangers. — Buoy. — Manila bay is entered between Limit point (*Lat. 14° 14′ N., Long. 120° 35′ E.*) and Cochinos point, about 12 miles north-north-westward. The land on either side of the entrance is high. The entrance is divided into two channels, named South channel and North channel, by Corregidor and Caballo islands; both these channels are deep and clear of dangers.

Limbones island, a small rocky island, 310 feet (94m5) high, lies close northward of Limit point.

Between Limit point and Restinga point, 5½ miles north-eastward, the coast is high and cliffy. Carabao (Karabao) island, 185 feet (56m4) high, and rocky, lies about 4 cables offshore and 2 miles north-eastward of Limbones island; between them is the entrance to Limbones cove, in which there are no dangers. Calungpang (Kalungpang) point lies about 3½ miles north-eastward of Limit point.

Chart 3559, plan of Mariveles harbour.

Cochinos point is the south-eastern extremity of a small wooded peninsula, 355 feet (108m2) high, connected to the mainland northward by a narrow isthmus, 78 feet (23m8) high.

Los Cochinos are five rocks, of which the highest has an elevation of 65 feet (19m8), situated on a bank, with depths of less than 3 fathoms (5m5) over it, which extends about 4 cables southward from Cochinos point; a rock, with a depth of 4 feet (1m2) over it, lies between the inner islet and the point.

Guardia shoal, with a least depth of one fathom (1m8) over it, and steep-to, lies about half a mile south-south-eastward of Cochinos point. A black can buoy is moored about half a cable south-south-eastward of the shoal.

Palomonti rocks, 18 feet (5m5) high, lie about 4 cables south-eastward of Cochinos point; a spit, with a depth of 13 feet (4m0) over it, extends about half a cable south-westward from the rocks, and a spit, with a

Digitized by Google

Chart 3559, plan of Mariveles harbour.

depth of 3 feet (0m9) over it, extends about the same distance northward.

Between Cochinos point and Gorda point, about 1½ miles northeastward, is the entrance to Mariveles harbour (*see* below).

Chart 976.

The coast between Gorda point and Alasasin point, about 2½ miles eastward, and thence to Lokanin point, about 4 miles north-eastward, is composed of steep, rocky bluffs of moderate elevation, and fringed by a bank, with depths of less than 3 fathoms (5m5) over it, extending about 2½ cables offshore.

Chart 3559, plan of Mariveles harbour.

Sisiman bay, entered between Gorda point and Aguawan point, about 6½ cables eastward, has two small piers at Sisiman village, in the north-western corner.

Chart 976.

Islands in entrance to Manila bay. — Lights. — Dangers. — La Monja, a rock, 121 feet (36m9) high, lies about 2¼ miles south-south-eastward of Cochinos point.

A light is exhibited, at an elevation of 118 feet (36m0), from a wooden platform, on La Monja.

An obstruction lies about 1¼ miles south-eastward of La Monja.

Corregidor island lies about 2½ miles eastward of La Monja ; near the western end of the island there are three peaks, the southernmost of which is 589 feet (179m5) high.

A light is exhibited, at an elevation of 628 feet (191m4), from a tower on the summit of Corregidor island.

Santa Amalia and Horadaba rocks lie close off the north-western side of the island.

In Corregidor cove, situated on the northern side of the island, about 1¼ miles eastward of its western end, there are two small wharves and some prominent buildings.

A light (*Lat. 14° 23′ N., Long. 120° 35′ E.*) is exhibited, at an elevation of 18 feet (5m5), from the roof of a house, on San Jose wharf at Corregidor cove.

A reef, on which there are some rocks above water, extends about half a mile southward from the eastern extremity of Corregidor island.

Caballo island, a bluff rocky island, 381 feet (116m1) high, and partly covered with vegetation, lies with its north-eastern extremity about 8 cables southward of the eastern extremity of Corregidor island. Reefs extend about three-quarters of a mile westward and 3 cables eastward from Caballo island. The navigable channel, with a least depth of 7½ fathoms (13m7) between the reefs extending from Corregidor and Caballo islands, is about three-quarters of a mile wide.

A light is exhibited, at an elevation of 319 feet (97m2), from a white wooden framework structure, on the summit of Caballo island.

El Fraile, a rock, 40 feet (12m2) high, covered with buildings and resembling a battleship from a distance, lies about 2 miles north-westward of Restinga point ; a coral patch, with a depth of 7 fathoms (12m8) over it, lies about a quarter of a mile eastward of the rock.

Signal station.—There is a signal station near Corregidor lighthouse.

Chart 3559, plan of Mariveles harbour.

Mariveles harbour. — Light. — Dangers. — Buoys. — Mariveles

Digitized by Google

Chart 3559, plan of Mariveles harbour.

harbour is easy of access, and affords good anchorage sheltered from all but south-easterly winds.

A 3-fathom (5m5) rocky patch lies 1½ cables offshore about 2 cables east-north-eastward of Cochinos point and a bank, with depths of less than 5 fathoms (9m1) over it, extends about a quarter of a mile from the head of the harbour; with these exceptions there are no dangers outside a distance of one cable from the shore.

The village of Mariveles, situated near the north-western shore of the bay, is connected to the general telegraph system.

Close south-westward of the village is the quarantine station for Manila, consisting of some prominent buildings, off which is a pier, which had, in 1940, depths of 11 and 26 feet (3m4 and 7m9), respectively, alongside its southern and northern ends. Water is laid on to the pier.

A light is exhibited, at an elevation of 40 feet (12m2), from a platform near the northern end of the quarantine pier.

A black buoy, marking the entrance to Pucot river, is moored about one cable southward of the southern end of the quarantine pier; a mooring buoy lies about 2 cables eastward of the head of the pier.

Anchorage. — Vessels may obtain anchorage, in a depth of 17 fathoms (31m1), with the quarantine pier bearing 300°, or may proceed farther into the bay if necessary; the holding ground is good.

Typhoon signals.—Typhoon signals are shown at the quarantine station. *See* page 16.

Chart 976.

Southern side of Manila bay. — Light. — Dangers. — The entrance to Maragondon river, 3¼ miles eastward of Restinga point, is the eastern boundary of the high land on the southern side of Manila bay; thence to Sangley point (*Lat. 14° 30′ N., Long. 120° 55′ E.*), about 17 miles north-eastward, the coast is low and marshy. On this stretch of coast there are several towns which are connected to the railway system, but they are of little commercial importance.

San Nicolas shoals extend about 4½ miles offshore from a position midway between Restinga and Sangley points. The outer shoal, with a least depth of 1¾ fathoms (3m2) over it, situated about 9½ miles west-south-westward of Sangley point, is steep-to on its western and northern sides. Between the outer shoal and the coast there are depths of less than 5 fathoms (9m1). La Monja (page 218), bearing about 251°, and just open northward of Corregidor island, leads northward of these shoals.

A light is exhibited, at an elevation of 35 feet (10m7), from a white circular iron tower on a concrete base on the northern side of San Nicolas shoals.

Western and northern sides of Manila bay. — Dangers. — Between Lokanin point and the eastern slopes of Orion hill, about 6¾ miles northward, the coast continues to consist of rocky bluffs with occasional sandy beaches between the points, and is fringed by a gradually widening reef. Northward of Orion hill, which is 465 feet (141m7) high, the coast is generally low, and is fringed by a bank, with depths of less than 3 fathoms (5m5) over it, which extends from about 4 cables offshore at Pandan point, situated about one mile north-north-eastward of Orion hill, to 1¾ miles near the mouth of Tiawir river, about 6 miles farther northward.

There are several small towns on this part of the coast, which have

Digitized by Google

Chart 976.

regular steamer communication with Manila, but none of them is of importance.

Pampanga bay, in the north-western corner of Manila bay, has depths of less than 3 fathoms (5m5). Orani and Pasag rivers, both of which can be entered at low water by small vessels with local knowledge, drawing about 5 feet (1m5), discharge into Pampanga bay.

The northern and north-eastern shores of Manila bay are formed by the delta of Pampanga and other large rivers; they are low and marshy, and from them a bank, with depths of less than 5 fathoms (9m1) over it, extends from 2 to 4 miles offshore. Some of the rivers discharging into this part of the bay are navigable by small craft with local knowledge, but they are seldom used.

At Navotas, about 3 miles northward of Manila, there is a patent slip, *see* Appendix I.

Chart 3487.

Cavite harbour and approaches. — Lights. — Buoyage. — Sangley point is the termination of a low peninsula, which extends north-eastward from the southern side of Manila bay; the point was reported, in 1939, to be extending at the rate of about 35 feet (10m7) a year.

There is a tower situated about 4 cables westward of Sangley point, and a tank, 116 feet (35m4) high, about three-quarters of a cable east-south-eastward of the tower; another tank, 115 feet (35m0) high, is situated about half a mile south-westward of the tower.

A light is exhibited, at an elevation of 58 feet (17m7), from a white circular steel tower, with a black spiral stripe, near the extremity of Sangley point (*Lat. 14° 30′ N., Long. 120° 55′ E.*).

Cavite harbour lies between the peninsula mentioned above and the mainland south-eastward.

The town and dockyard of Cavite stand on a low peninsula about three-quarters of a mile southward of Sangley point, from which it is separated by Canacao bay; it is joined to San Roque on the mainland westward by a causeway.

Bacoor bay, entered between the eastern end of Cavite and the mouth of Imus river, about 1½ miles southward, is shallow; it only affords shelter to small craft. The shore at the head of this bay and eastward of it is low, marshy, and intersected by the estuaries of numerous small rivers.

Charts 3487, plan of Manila and Cavite anchorages, 976.

Obstructions.—Buoy.—Two obstructions, the existence of which is doubtful, lie about 3 miles west-north-westward and 1½ miles north-westward, respectively, of Sangley point.

An obstruction, with a depth of 14 feet (4m3) over it, marked by a conical buoy, painted in red and black bands, lies 11½ cables north-eastward of Sangley point light-structure.

Two obstructions, which have been swept to a depth of 9 feet (2m7) and 2 feet (0m6), lie about one cable and 3½ cables, respectively, northward, of the chimney near the eastern end of Cavite.

Chart 3487, plan of Manila and Cavite anchorages.

Anchorage.—Vessels may obtain anchorage, in a depth of about 4 fathoms (7m3), mud, sheltered from southerly and south-westerly winds, eastward of Sangley point.

For traffic regulations, *see* page 221.

Charts 3806, 943, 2661b, 1263.

Digitized by Google

Chart 3487, plan of Manila and Cavite anchorages.

Prohibited anchorage.—Anchorage is prohibited in an area, indicated on the chart by pecked lines extending west-south-westward from the north-western corner of the air port (page 224) and from the shore about 1½ miles south-south-eastward; the northern limit is the southern limit of Manila harbour; the southern limit is the northern limit of Cavite anchorage.

Harbour facilities.—There are patent slips, at Cavite, Canacao and San Roque. For dimensions of the largest slip, *see* Appendix I. Repairs can be executed.

There are facilities for coaling from lighters as well as from the wharves at Sangley point.

A mooring buoy is laid 9 cables north-north-eastward of Sangley point.

Typhoon signals.—Typhoon signals are shown at the dockyard. *See* page 16.

Charts 3487, plan of Manila harbour, 976.

MANILA HARBOUR.—Manila harbour is situated at the eastern end of Manila bay, about 7 miles north-north-eastward of Cavite, and off the mouth of Pasig river.

The harbour limits are defined by a line drawn in a 255° direction from the north-western corner of the air port under construction, about 11 cables south-eastward of the south-eastern extremity of South breakwater; thence by a line drawn in a 000° direction through Sangley point lighthouse; thence by a line drawn in a 270° direction from the mouth of Vitas river, situated about 2 miles northward of the mouth of Pasig river; thence by the coast line to the root of the northern breakwater of the air port.

Chart 3487, plan of Manila and Cavite anchorages.

Bank.—Obstruction.—A bank, with depths of less than 3 fathoms (5^{m}5) over it, extends about 1¼ miles westward from the mouth of Pasig river, situated about 6½ miles north-north-eastward of Sangley point (*Lat. 14° 30′ N., Long. 120° 55′ E.*); westward of this bank the depths increase gradually to 6 fathoms (11^{m}0) about 2 miles offshore, but there is an obstruction, with a depth of 10 feet (3^{m}0) over it, situated about 1½ miles westward of the northern entrance point of Pasig river.

Anchorage.—Vessels not intending to immediately enter the harbour or Pasig river may anchor as convenient outside the breakwaters northward of the prohibited anchorage.

Quarantine anchorage. — Light-buoy. — The quarantine anchorage is situated between 1¼ and 3¼ miles westward of South breakwater; its limits are indicated by a pecked line on the chart.

A light-buoy, painted black, exhibiting a *white flashing* light *every two seconds*, is moored about 3½ miles north-north-westward of Sangley point and close northward of the south-western corner of the quarantine anchorage.

Traffic regulations.—All merchant vessels on entering Manila bay shall show their colours and signal their official numbers or letters and the number of sacks of mails (if any) on board when within signal distance of Corregidor island, and shall keep such signal displayed for a period of not less than 15 minutes, and in all cases till the signal station on Corregidor island is abeam.

Charts 3806, 943, 2661b, 1263.

Digitized by Google

Chart 3487, plan of Manila and Cavite anchorages.

Vessels entering the port of Manila from southward, upon arriving off Limbones island, shall not bring Caballo island lighthouse to bear more than 056°, and in passing through South channel shall keep the bearing of this lighthouse less than 056°, and shall not approach within a distance of one mile of the coast or of any island. The same route shall be followed by vessels leaving Manila bay by South channel.

Vessels from northward entering the port of Manila by South channel, upon arrival off Hornos point, situated about 1¼ miles westward of Cochinos point, shall not bring El Fraile rock to bear more than 116°, until Caballo island lighthouse bears 056°, and shall then proceed to their anchorage at Manila following the directions given above for South channel.

Vessels entering through North channel shall pass between La Monja and Guardia shoal, and shall proceed directly through the middle of the channel between Corregidor island and the mainland. The same route shall be followed by vessels leaving Manila bay by North channel.

Vessels entering or leaving the port of Manila are prohibited from remaining or anchoring at any place between the entrances to Manila bay and the anchorages in Manila harbour.

Vessels manœuvring in Pasig river and not under way shall carry at night, besides the anchor lights, a *red* light which shall be placed 4 feet (1^{m}2) below the *white* anchor light in the same vertical line, and also the side lights. As soon as the vessel is under way these lights shall be lowered and the regulation masthead light shall be lighted.

By day the letter D of the International Code of Signals shall be displayed until the vessel has cleared the mouth of the river.

Chart 976.

Compass correction.—The following transits may be found useful for ascertaining the error of the compass.

The light-structure on San Nicolas shoals in line with Mount Sungay, 139° 33′.

Sangley point (*Lat. 14° 30′ N., Long. 120° 55′ E.*) water tower in line with Mount Sungay, 163° 34′.

Mount Sungay (chart 3806) is a prominent sharp peak, 2,466 feet (751^{m}6) high, at the eastern end of a tableland, about 22 miles south-south-eastward of Sangley point.

Chart 3487, plan of Manila harbour.

The light-structure on the head of West breakwater in line with the mast of the Custom house, 40° 17′.

The light-structure on the north-western end of South breakwater in line with the mast of the Custom house, 34° 04′.

The light-structure on the south-eastern end of South breakwater in line with the mast of the Custom house, 14° 39′.

South harbour and approaches. — Breakwaters. — Dangers. —Buoys.—South harbour is formed by West and South breakwaters. West breakwater extends about 1¼ miles south-south-westward from Engineer island, an artificial island lying on the southern side of the entrance to Pasig river. South breakwater lies with its north-western extremity about 1¼ cables south-eastward of the southern extremity of West breakwater and extends about half a mile south-eastward.

The entrance between these breakwaters has a least depth of 29 feet

Digitized by Google

Chart 3487, plan of Manila harbour.

(8m8), and thence to the piers there is a channel, with depths of from 29 to 37 feet (8m8 to 11m3), but on either side of it there are numerous obstructions.

The southern entrance is about one mile wide between the south-eastern end of South breakwater and the northern end of the western breakwater forming the Yacht basin, but a foul area extends nearly the whole distance, reducing the navigable channel to a width of about 1¼ cables close eastward of the south-eastern end of South breakwater, with a depth which has been swept to 15 feet (4m6). This foul area is marked by five red conical buoys on its northern side, by two black can buoys on its southern side, and by a buoy with red and black bands at the eastern end.

An obstruction, which has been swept to a depth of 16 feet (4m9), lies about 1¾ cables westward of the head of West breakwater. A shoal, with a least depth of 11 feet (3m4) over it, lies about 2½ cables west-north-westward of the south-eastern end of South breakwater, and a 17-foot (5m2) patch lies about 6 cables south-westward of the same end.

A mooring buoy, connected by a submarine cable with the head of West breakwater, is laid about one mile south-south-westward of it.

Lights.—A light is exhibited, at an elevation of 24 feet (7m3), from a white concrete pillar, on the south-eastern end of South breakwater.

A light is exhibited, at an elevation of 37 feet (11m3), from a circular steel tower, on a concrete base, on the north-western end of South breakwater (*Lat. 14° 34′ N., Long. 120° 57′ E.*).

A light is exhibited, at an elevation of 40 feet (12m2), from a circular steel tower, on a concrete base, on the head of West breakwater.

A light is exhibited, at an elevation of 200 feet (61m0), from a tower on the Custom house, situated about three-quarters of a cable northward of the root of No. 9 pier (*see* below).

Chart 976.

Three lights are exhibited from each of two radio towers, the upper light in each tower at an elevation of 387 feet (118m0), at Malabon, about 3½ miles northward of the Custom house light.

A light is exhibited, at an elevation of 300 feet (91m4), on a radio tower at Malinta, situated about 6¾ miles northward of the Custom house light.

An air light is exhibited at Maricaban, situated 2½ miles south-south-eastward of Fort San Antonio Abad (page 224).

Chart 3487, plan of Manila harbour.

Piers.—Submerged breakwater.—Buoys.—There are eight odd-numbered piers extending south-westward from the northern end of South harbour. Nos. 5, 9 and 13 are suitable for large vessels to lie alongside. There is a 28-foot (8m5) patch about half a cable south-westward of the head of No. 5 pier; a bank, with a least depth of 28 feet (8m5) over it, extends about half a cable south-westward from the head of No. 9 pier, and a 29-foot (8m8) bank extends a short distance from the head of No. 13 pier.

There is a flagstaff close to the root of No. 15 pier.

A submerged breakwater extends about 1¼ cables south-westward from a position about half a cable south-eastward of the root of No. 15 pier. A shoal, which has been swept to a depth of 9 feet (2m7), lies close off the head of this breakwater, and a red conical buoy is moored close westward of it.

Charts 3806, 943, 2661b, 1263.

Digitized by Google

Chart 3487, plan of Manila harbour.

A mooring buoy is situated about 3¼ cables south-south-eastward of the head of No. 13 pier, and another about 6 cables east-north-eastward of the south-eastern end of South breakwater. A can buoy is moored about 7½ cables east-north-eastward of the same end of South breakwater.

Air port.—Yacht basin.—Lights.—An air port is under construction southward of South harbour ; its northern end is sheltered by a breakwater extending about half a mile west-south-westward from a position about 1½ cables south-south-westward of Fort San Antonio Abad, situated about 1½ miles eastward of the south-eastern end of South breakwater.

The Yacht basin lies immediately northward of the air port, and is protected on its western side by a breakwater extending 3 cables north-north-westward from about the middle of the breakwater which forms the northern side of the air port, and on its northern side by a detached breakwater.

A light is exhibited, at an elevation of 35 feet (10m7), at the head of the breakwater forming the western side of the Yacht basin.

A light is exhibited from a grey concrete pyramid, 12 feet (3m7) in height, situated at the western end of the Yacht basin detached breakwater.

Quarantine. — The quarantine station is at Mariveles harbour (page 218).

Pilotage.—Pilotage is optional for vessels proceeding to or leaving an anchorage in Manila harbour, but is compulsory for vessels proceeding to and from the piers in the harbour or in Pasig river.

Signal station.—Typhoon signals.—There is a signal station on Engineer island (*Lat. 14° 36′ N., Long. 120° 58′ E.*). Typhoon signals are shown from this signal station and from the corner of Calle Aduana and Arzobispo. *See* page 16.

Pasig river.—Light.—Pasig river, which connects Manila with Laguna de Bay, a large fresh water lake lying south-eastward of Manila, is entered between two stone training walls extending westward from its northern and southern entrance points.

From a position outside the bank, about three-quarters of a mile northward of the southern extremity of West breakwater, a channel, in which there was a least depth of 14 feet (4m3), in 1949, leads north-north-eastward to the entrance of the river.

Pasig river is navigable by sea-going vessels as far as Jones bridge, about one mile above the entrance, and had, in 1950, a least depth of 13 feet (4m0). There are wharves at which vessels that can reach the entrance can berth alongside. Both the entrance channel and the river are subject to constant shoaling.

Above Jones bridge there are four other bridges, each of which has sufficient clearance for the small lake steamers which connect Manila with the towns on Laguna de Bay.

Chart 3806.

A light is exhibited, at an elevation of 40 feet (12m2), from a white concrete pillar, at Napindam, on the northern side of Laguna de Bay, about 6½ miles eastward of the air light at Maricaban.

Inner basin.—The Inner basin, in which there are depths of from one to 14 feet (0m3 to 4m3), lies at the northern end of South harbour. The channel leading through the basin has a least depth of 7 feet (2m1)

Charts 976, 3806, 943, 2661b, 1263.

Digitized by Google

Chart 3806.

and connects with a canal about 1¼ cables long, with a least depth of 7 feet (2m1), which leads into the southern side of the entrance to Pasig river.

Tidal streams.—The tidal streams in Pasig river are strong, especially the out-going stream during the rainy season.

Chart 3487, plan of Cavite and Manila anchorages.

Bank.—Obstructions.—The bank, with depths of less than 5 fathoms (9m1) over it, extending about 1¾ miles offshore northward of the entrance to Pasig river, was reported, in 1946, to have depths of from 2 to 4 feet (0m6 to 1m2) less than charted.

An obstruction, the existence of which is doubtful, was reported, in 1948, to lie about 2¼ miles north-westward of the light-structure on the northern side of the entrance to Pasig river. There are numerous obstructions, which have been swept to depths of from 10 to 17 feet (3m0 to 5m2), in the western and north-western approaches to North harbour.

North Harbour.—North harbour, situated northward of the entrance to Pasig river, was under construction in 1947. Seven piers, all even-numbered, and the southern part of the breakwater have been completed, the north-western portion of the breakwater is submerged. The depths in the harbour and alongside the piers are less than 3 fathoms (5m5). The area between Nos. 12 and 14 piers, at the northern end of the harbour, is foul.

Light-buoy.—A light-buoy, painted red, exhibiting a *white flashing* light *every five seconds*, is moored about 1¾ miles north-north-westward of the entrance to Pasig river and about 1¼ cables north-north-westward of the submerged end of North harbour breakwater (*Lat. 14° 36′ N., Long. 120° 57′ E.*).

City of Manila.—The city of Manila, situated on both sides of the mouth of Pasig river, had a population, in 1948, of 1,024,557, and is the largest town in the Philippines. It is the seat of Government of the Philippine islands, and the principal port of entry and chief distributing centre for imported goods.

There is an Envoy Extraordinary and Minister Plenipotentiary at Manila.

Trade.—The principal exports are sugar, coconut oil, copra, hemp, tobacco, embroideries and cordage; the chief imports are iron and steel goods, cotton goods, mineral oil, automobiles, wheat, flour, coal, rice and paper.

Harbour facilities.—There are two patent slips; for the dimensions of the larger slip, *see* Appendix I.

Repairs can be carried out, and there are several floating cranes capable of lifting up to 50 tons.

Large quantities of fuel oil, Diesel oil, and coal are available. Water and fuel oil are laid on to all piers. Water boats, fitted with pumps, deliver water to vessels at anchor.

Stores and provisions of all kinds can be obtained.

There are several hospitals with accommodation for seamen.

Climatic table.—*See* page 40.

Consul.—A British Consular officer resides at Manila.

Communications.—For communications, *see* page 5.

Charts 976, 3806, 943, 2661b, 1263.

Digitized by Google

CHAPTER XI

WEST COAST OF LUZON, FROM MANILA TO SAN FERNANDO HARBOUR, INCLUDING LINGAYEN GULF

Chart 976.

WESTERN SIDE OF LUZON.—Aspect.—Near the southern end of the peninsula which forms the western side of Manila bay the Mariveles mountains rise to an elevation of 4,660 feet (1,420m3); Mount Bataan, the highest peak, is situated about 6¾ miles north-north-westward of Cochinos point (page 217).

Mount Natib, 4,222 feet (1,286m9) high, and Mount Silanganan, 3,620 feet (1,103m4), are situated, respectively, about 12½ miles and 12 miles north-north-westward of Mount Bataan; they are separated from the Mariveles range by a low valley.

Climate and weather.—*See* page 22.

Coast.—Dangers.—The coast between Cochinos point and Luzon point, about 7 miles west-north-westward, and thence to Saysain point, 6¾ miles northward, is indented by several small bays, some of which have sandy beaches at their heads; the points separating them are moderately high, rocky, and fringed by coral reefs.

Hornos point (*Lat. 14° 25′ N., Long. 120° 29′ E.*) lies about 1¼ miles westward of Cochinos point.

A rock, which dries, lies about 2¼ cables southward of Guay (Guai) point, situated about three-quarters of a mile east-south-eastward of Luzon point; with this exception there are no detached dangers outside the fringing reef.

Guay bay, entered between Guay point and Vigia point, about 1½ miles east-south-eastward, affords anchorage, sheltered from north-eastward.

Bagac (Bagak) bay is entered between Saysain point and Napo point, about 5½ miles north-westward. Foul ground extends about half a mile from Saysain point. Cabayoc (Kabayok) point and Mapalan point, about 3¼ and 2 miles, respectively, eastward of Napo point, are fringed by foul ground which extends about 3½ cables from each point. Pandil islet, 42 feet (12m8) high, lies close southward of Napo point, to which it is joined by a reef; foul ground extends about 4 cables southward from the islet.

Anchorage may be obtained off the town of Bagac (Bagak), situated 2 miles south-south-eastward of Cabayoc point, in depths of from 5 to 10 fathoms (9m1 to 18m3), taking care to avoid a 3-fathom (5m5) patch, situated about 1¼ miles north-north-westward of the northern extremity of Saysain point. This anchorage is very exposed, the land

Charts 3806, 943, 2661b, 1263.

Digitized by Google

Chart 976.

breeze blowing with considerable force from the Mariveles and Silanganan mountains, and the North-east monsoon reaching the bay through the valley between them.

Between a point about one mile north-westward of Napo point, and Panibatujan point, about 3 miles farther in the same direction, the coast consists of a sandy beach, from which a bank, with depths of less than 3 fathoms (5m5) over it, extends half a mile. Foul ground extends about half a mile south-south-westward from the first mentioned point, and three-quarters of a mile from Panibatujan point.

Between a position about 6 cables north-westward of the town of Moron, situated about half a mile northward of Panibatujan point, and Buiong point, about 3 miles northward, the coast is low and wooded, and fringed by a reef which extends as much as 3 cables offshore; foul ground, with depths of less than 5 fathoms (9m1) over it, extends about one mile southward and 6 cables westward from Mayagao point, situated about 1¾ miles north-westward of Panibatujan point.

Moron shoal, with a least depth of 5¼ fathoms (9m6) over it, lies about 1¼ miles westward of Panibatujan point; the channel between this shoal and the coastal bank north-eastward is about one cable wide.

Port Binanga.—Dangers.—Port Binanga lies on the eastern side of the entrance to Subic bay, and is entered between Buiong point and Binanga point, about one mile north-north-westward. A spit, with depths of less than 5 fathoms (9m1) over it, extends about 6 cables west-south-westward from Binanga point. Two 7-fathom (12m8) patches lie about half a mile outside the entrance to Port Binanga, about 1¼ miles and one mile, respectively, southward of Binanga point (*Lat. 14° 45′ N., Long. 120° 15′ E.*). A 5-fathom (9m1) patch lies about 6 cables south-south-westward of the same point, and a 2½-fathom (4m6) patch about half a mile south-south-eastward.

At the head of the port there are two small sandy beaches separated by Dapua point, a prominent point, with vertical cliffs, from 60 to 70 feet (18m3 to 21m3) high. The southern and northern shores of the bay are fringed by reefs which extend nearly one cable offshore.

Anchorage.—Directions.—Vessels can anchor, in depths of from 4 to 6 fathoms (7m3 to 11m0), mud, in the middle of the port, sheltered from all but westerly winds.

Vessels entering the port should keep Dapua point bearing 090°, which leads southward of the 2½-fathom (4m6) patch mentioned above.

SUBIC BAY.—Islands and dangers.—Lights.—Buoyage.—Subic bay is entered between Binanga point and Sueste point, about 3¼ miles westward. The entrance is divided by Grande island into two channels, the western of which is deep, and is free from dangers; the channel eastward of Grande island is narrow and tortuous, and should only be used by vessels with local knowledge.

Between Binanga point and Camayan (Kamayan) point, about three-quarters of a mile north-north-westward, the coastal reef extends about a quarter of a mile offshore, and a spit, with depths of less than 3 fathoms (5m5) over it, extends a further quarter of a mile westward from the edge of the reef at Camayan point.

Grande island, 167 feet (50m9) high, lies 8½ cables north-westward of Camayan point. The island is fringed by a reef which extends about 6½ cables southward, with depths of less than 3 fathoms (5m5) over it.

Charts 3806, 943, 2661b, 1263.

Digitized by Google

Chart 976.

Chiquita islet lies on this reef about 1½ cables southward of the island, and a 4-fathom (7m3) patch lies about 7 cables southward of the islet.

A light is exhibited, at an elevation of 43 feet (13m1), from a grey steel mast, on Grande island.

Between Sueste point, which is high and steep-to, and Macmany (Makmany) point, 1½ miles north-north-eastward, and thence to the head of the bay, a bank, with depths of less than 3 fathoms (5m5) over it, extends from one to 3 cables offshore.

A light is exhibited, at an elevation of 207 feet (63m1), from a white circular iron tower and dwelling with a red roof, on Sueste point. *See* view facing page 42.

A light is exhibited, at an elevation of 39 feet (11m9), from a white concrete tower, on Agusuhin point, 2½ miles northward of Macmany point.

Between Camayan point and Cubi (Kubi) point, about 2¾ miles north-north-eastward, the coast is indented by Ilanin and Triboa bays. A spit, with depths of less than 3 fathoms (5m5) over it, extends about half a mile westward from Nabasan point, which separates the two bays. A bank, with depths of less than one fathom (1m8) over it, extends about three-quarters of a mile west-north-westward from Pamocan (Pamokan) point, a bluff situated 6½ cables southward of Cubi point, and a 2¾-fathom (5m0) patch, marked by a red conical buoy, No. 2, lies one mile from the point in the same direction.

Cubi point (*Lat. 14° 48′ N., Long. 120° 16′ E.*) is a bluff, 88 feet (26m8) high ; from it a bank, with depths of less than one fathom (1m8) over it, extends about three-quarters of a mile north-westward, and is marked at its outer end by a red conical buoy, No. 4.

Port Olongapo, entered between Cubi point and Kalaklan point, about 1½ miles northward, is described on page 229.

Kalaklan point is low, but rises steeply to an elevation of 354 feet (107m9). A light is exhibited, at an elevation of 234 feet (71m3), from a white concrete tower, on the point. The western mouth of Kalaklan river enters the bay close eastward of the point.

Mayanga islet, 38 feet (11m6) high, lies about 2 miles west-north-westward of Kalaklan point ; a spit extends about 3½ cables southward and 2½ cables northward from the islet ; a black can buoy is moored about 3 cables north-westward of the light-tower, and the outer edge of the southern spit is marked by a black can buoy No. 1.

A light is exhibited, at an elevation of 70 feet (21m3), from a white concrete tower, on Mayanga islet.

Between Kalaklan point and the head of the bay, about 3¾ miles north-westward, the coastal bank, with depths of less than 3 fathoms (5m5) over it, extends in places half a mile offshore.

Gaviota rock, 8 feet (2m4) high, lies on the western side of a spit, with depths of less than 3 fathoms (5m5) over it, which extends about half a mile southward from the coast about 1¾ miles north-westward of Kalaklan point, and is marked by a black can buoy.

Pequeña island, 180 feet (54m9) high, lies about 1¼ miles northward of Mayanga islet ; it lies on a bank, with depths of less than 3 fathoms (5m5) over it, which extends about half a mile westward and a quarter of a mile southward, and connects with the shore north-eastward. A 1½-fathom (2m7) patch, marked on its southern side by a black can buoy, lies about 3 cables southward of the island.

Charts 3806, 2661b, 1263.

Digitized by Google

Chart 976.

A black can buoy is moored about 2 cables eastward of the northern end of Pequeña island.

The head of Subic bay, northward of Pequeña island, is fringed by a reef, which extends from about 2 to 7 cables offshore.

The unimportant town of Subic, situated near the head of the bay, has regular steamer communication with Manila.

A number of mooring buoys are laid between Grande island and Pamocan point; southward of the entrance to the inner basin at Port Olongapo, and westward of Pequeña island.

Anchorage.—Directions.—There is good anchorage for small vessels with local knowledge off the mouth of the Guadagi river, on the western side of the town of Subic. Vessels anchoring in this position should take care to avoid the bank extending from the coast between Cabangan point, near the mouth of the river, and Apalit point, about half a mile westward.

Vessels can also anchor in any convenient position off the shores of Subic bay.

A vessel entering Subic bay should pass in mid-channel between Grande island and Macmany point. If bound for Subic, when the northern end of Grande island bears about 090°, she should steer for Pequeña island, bearing about 015°, until Mayanga islet bears 105°, when she should steer to pass not less than half a mile westward of Pequeña island (*Lat. 14° 51′ N., Long. 120° 14′ E.*); when it bears about 090° she should alter course eastward and steer for the town of Subic, anchoring as directed above.

Prohibited anchorage.—Anchorage is prohibited in an area, indicated on the chart by pecked lines, extending to the shore westward and north-eastward from Pequeña island.

Port Olongapo. — Dangers. — Lights. — Buoys. — Beacon. — About one mile eastward of Cubi point is Nagcaban point, and between them a bank, with depths of less than 3 fathoms (5^m5) over it, extends about 2 cables from the southern shore. A bank, with a depth of 2 fathoms (3^m7) at its outer end, where it is marked by a red conical buoy, extends about a quarter of a mile east-north-eastward from Nagcaban point.

Caiman shoal, partly awash, lies about 6 cables north-westward of Nagcaban point. The northern edge of the shoal, about $1\frac{1}{4}$ cables north-north-eastward of the light-tower, is marked by a red conical buoy, No. 6. Foul ground extends about one cable south-westward from the light-tower.

A light is exhibited, at an elevation of 40 feet (12^m2), from a white conical truncated stone tower, on Caiman shoal.

Carrasco shoal, with a depth of 10 feet (3^m0) over it, lies about a quarter of a mile southward of the light-tower on Caiman shoal.

Between Kalaklan point and Rivera point, at the entrance to the inner basin about $1\frac{1}{4}$ miles south-eastward, the northern shore of the port is low and sandy, with low marshy ground inland. The buildings of the dockyard on Rivera point are prominent. The village of Olongapo stands close westward of the dockyard.

A reef lies about a quarter of a mile south-eastward of Rivera point; its south-western and southern extremities are each marked by a black can buoy.

The inner basin, eastward of Rivera point, is protected by shoals

Digitized by Google

Chart 976.

in the entrance, through which there is a narrow channel, marked by buoys, which are numbered.

Two white triangular beacons, each with a black vertical stripe, stand on Magdalen bluff on the eastern side of the basin, and in line, bearing 063°, lead through the buoyed channel.

A light is exhibited, at an elevation of 16 feet (4^{m}9), from a mast, surmounted by a black rectangle, on a concrete base situated on the western side of the entrance to the inner basin.

Anchorage.—Directions.—There is good anchorage, in depths of from 12 to 13 fathoms (21^{m}9 to 23^{m}8), mud, southward of the dockyard, about half a mile eastward of Caiman shoal light-tower.

After passing the northern end of Grande island a vessel bound for Olongapo should steer for Kalaklan point summit, bearing about 050°, until Mancha Blanca, a prominent white spot on the cliff next eastward of Nagcaban point, bearing 110°, is well open of that point, thence she should steer eastward to pass about a quarter of a mile northward of Caiman shoal to the anchorage.

There is also good anchorage, sheltered from all winds, in the inner basin near the dockyard.

A vessel proceeding to the inner basin, after passing Caiman shoal light-tower, should steer south-eastward until the leading beacons are in line, bearing about 063°; these beacons must be kept accurately in transit while passing through the narrow entrance channel.

Communication.—Olongapo is connected to the general telegraph system. There is regular steamer communication with Manila.

Harbour facilities.—A floating dock is stationed at Olongapo, and there is a floating crane capable of lifting 25 tons. For dimensions of the floating dock, *see* Appendix I.

There is a pier, 400 feet (121^{m}9) long, alongside which vessels drawing 23 feet (7^{m}0) can lie.

A small stock of coal is maintained.

COAST.—Biniptican point (*Lat. 14° 45′ N., Long. 120° 11′ E.*) lies about 8 cables south-south-westward of Sueste point. Sampaloc (Sampalok) point, the southern extremity of the mountainous peninsula which forms the western side of Subic bay, lies about 1¼ miles westward of Biniptican point.

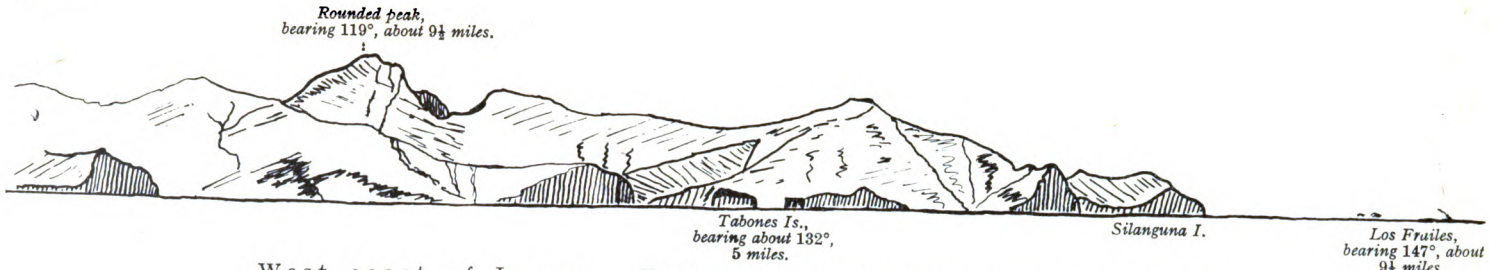
Silanguin island, 705 feet (214^{m}9) high, and bare, lies 3 miles west-north-westward of Sampaloc point; it is joined to the mainland eastward by a reef, and forms the southern side of the entrance to Port Silanguin. All the coast between Sueste point to Silanguin island is high and moderately steep-to.

Off-lying islets.—Los Frailes are a group of six small rocky, steep-to islets and several rocks, above and below water, lying about three-quarters of a mile south-westward of Silanguin island. The south-western islet, 90 feet (27^{m}4) high, is the largest of the group; the north-eastern islet is 35 feet (10^{m}7) high. The channel between the group and Silanguin island is deep.

Coast.—Dangers.—Port Silanguin, entered between the northern extremity of Silanguin island and a point of the mainland about one mile north-westward, affords fair shelter to vessels with local knowledge from all but south-westerly winds. The shore reef extends in places about a quarter of a mile from the head of the port, and a

Charts 3806, 2661b, 1263.

Digitized by Google

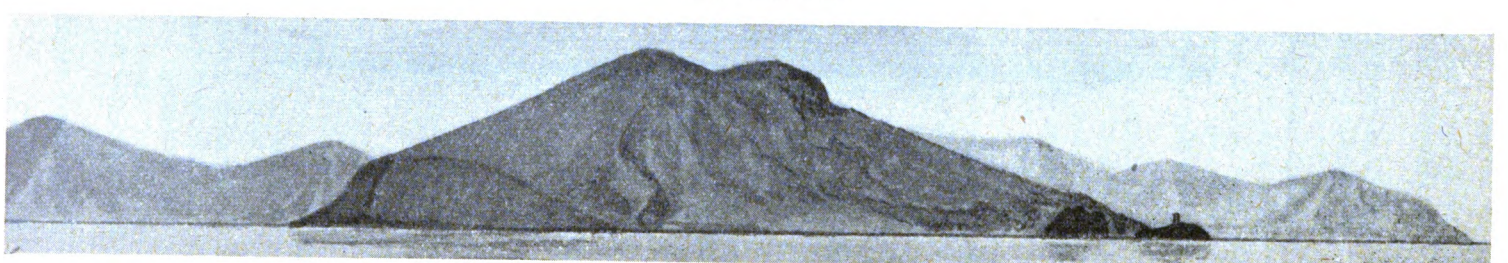


West coast of Luzon. Tabones islands from north-westward.

(*Original dated* 1947.)

West coast of Luzon. Capones islands from south-south-westward.

(*Original dated* 1947.)



Lighthouse.

Capon Grande lighthouse, bearing 144°, about 20 miles.

(*Original dated* 1916.)

Digitized by Google

To face page 231.

Cape Bolinao or Piedra point lighthouse bearing 090°, 8½ *miles.*

Rena point, bearing 135°.

West coast of Luzon from westward.

(*Original dated prior to* 1912.)

Cape Bojeador lighthouse bearing 151°.

North-western extremity of Luzon from north-westward.

(*Original dated prior to* 1912.)

Digitized by Google

Chart 976.

patch, with a least depth of 1¾ fathoms (3m2) over it, lies close off the eastern shore about 1¾ miles eastward of the northern extremity of Silanguin island.

The best anchorage is, in depths of from 17 to 20 fathoms (31m1 to 36m6), off the sandy beach eastward of the extremity of the mainland on the southern side of the port.

Between the northern entrance point of Port Silanguin and Capones point, 7¼ miles north-north-westward, the coast is high, rocky and indented by Nazasa, Talisain and Calaguaguin (Kalaguaguin) bays, each of which is easy of access, but being open westward, only afford shelter during the North-east monsoon. Foul ground extends about 2 cables from the points separating these bays.

A rock, 4 feet (1m2) high, lies about 3 cables south-westward of the northern entrance point of Nazasa bay; and a rock, awash, lies close south-westward of the north-western entrance point of Talisain bay. A rock, 151 feet (46m0) high, lies near the outer edge of a spit extending about 2 cables south-westward from the northern entrance point of Calaguaguin bay.

Capones point is a bare reddish headland, rising to an elevation of 1,090 feet (332m3) about three-quarters of a mile south-eastward of its extremity, which, when first seen from north-westward, appears as an island. A rock, 80 feet (24m4) high, lies close north-westward of the extremity of the point.

Off-lying islands and danger.—Light.—Tabones islets, two rocky islets, the higher of which has an elevation of 129 feet (39m3), lie about one mile west-north-westward of the northern entrance point of Nazasa bay.

Capones islands, a group of three small islands, lie off Capones point; Capon Grande, the largest of the group, is very prominent and lies about 2 miles north-westward of the point. The summit of the island is near the eastern end. The island is fringed by a reef, and a rock, with a least depth of 3½ fathoms (6m4) over it, lies about three-quarters of a mile south-westward of its eastern extremity.

A light (*Lat. 14° 55′ N., Long. 120° 00′ E.*) is exhibited, at an elevation of 234 feet (71m3), from a white square brick tower on a dwelling near the western end of Capon Grande. *See* views facing pages 42 and 230.

The two remaining islands of the Capones group lie close together on a reef, about one mile north-eastward of the eastern extremity of Capon Grande, from which they are separated by a deep channel. *Chart 3806.*

Coast.—Dangers.—The coast between Capones point and Botolan point, about 21 miles northward, is bordered by a sandy beach, which is steep-to, and contains several small unimportant towns.

A range of mountains commences about 9 miles north-eastward of Capones point and extends parallel with the coast for about 16 miles; Mount Botolan, prominent and thickly wooded, with an elevation of 1,852 feet (564m5), lies near its northern end and about 2 miles eastward of Botolan point. Eastward of this range, is the Cabusilan range. Mount Pinalobo, 5,922 feet (1,805m0) high, lies in the southern part of this range about 19 miles east-south-eastward of Mount Botolan. *See* view on chart 3806.

A 4½-fathom (8m2) patch lies about half a mile offshore, westward of

Digitized by Google

Chart 3806.

the town of San Narciso, situated about 7 miles northward of Capones point. Between the town of San Felipe, situated about 3 miles northward of San Narciso, and Botolan point, a bank, on which there are several detached shoals, with depths of from 3¼ to 7 fathoms (5m9 to 12m8) over them, extends about 5½ miles offshore, the outer danger being a 5-fathom (9m1) coral patch lying about 5¼ miles south-westward of Botolan point.

Botolan point is low and sandy, and is fringed by a reef which extends about 2 cables offshore; a 2¼-fathom (4m1) patch lies half a mile south-westward of the point; close northward of the point a spur from Mount Botolan terminates in a bluff point, 150 feet (45m7) high. Between Botolan point and Iba point, about 6 miles north-north-westward, the coast is low and sandy, and is fringed by a reef which, in places, extends about 6 cables offshore, with depths of less than 3 fathoms (5m5) over it. Bucao (Bukao) and Bancal rivers discharge about 1¾ and 4 miles, respectively, northward of Botolan point. The valley of the Bucao, northward of Mount Botolan, is well defined and serves to identify the anchorage off Iba.

A 3¾-fathom (6m9) patch lies about 7 cables offshore, about three-quarters of a mile north-north-westward of Botolan point.

A 3½-fathom (6m4) patch lies about one mile south-south-westward of Iba point.

Iba anchorage.—Iba point is low and projects slightly from a low sandy beach; it is fringed by a coral reef, which dries, extending about a quarter of a mile offshore.

Iba, the capital of the province of Zambales, is a small town of little commercial importance, situated about one mile eastward of the point; it is almost obscured by groves of coconut and banana trees, but the large iron roof of a building is prominent. During the South-west monsoon landing is difficult and frequently impossible; the landing place is situated about 1½ cables southward of Iba point.

There is anchorage, sheltered only during the North-east monsoon, for vessels with local knowledge, in a depth of 10 fathoms (18m3), southward of Iba point (*Lat. 15° 20′ N., Long. 119° 58′ E.*), about three-quarters of a mile from the landing place, with the extremity of the point bearing 001°. Small vessels can anchor, in a depth of 3 fathoms (5m5), sand, about a quarter of a mile southward of the landing place.

A vessel approaching the anchorage should steer for the canyon northward of Mount Botolan, bearing 091°, until the iron roof mentioned above bears 046°, when she should steer for it on that bearing until Iba point bears 001°, when she should steer for it on that bearing. Care should be taken to avoid the 3½-fathom (6m4) patch south-south-westward of Iba point and the coastal bank south-eastward of the landing place.

Coast.—The coast between Iba point and Palauig point, 7¼ miles north-westward, is fringed by a reef, which, in places, extends about half a mile offshore. A shoal, with a least depth of 3 feet (0m9) over it, lies about 7 cables offshore and 3¼ miles south-south-eastward of Palauig point. Palauig point is low and wooded, with a detached knoll, 48 feet (14m6) high, about three-quarters of a mile inland. Reefs extend about 3 cables westward, increasing to about 6½ cables off its northern extremity.

Charts 2661b, 1263.

Digitized by Google

Chart 3806.

Light.—A light is exhibited, at an elevation of 89 feet (27m1), from a white steel framework tower, on a dwelling on the summit of Palauig point. *See* view facing page 42.

Off-lying dangers.—Kinabakbagan reef lies from about 1¾ to 2¾ miles offshore; the shoalest spot, with a least depth of a quarter of a fathom (0m5) over it, coral, lies about 2¾ miles west-north-westward of Iba point. Several detached shoals, with depths of from 5 to 7 fathoms (9m1 to 12m8) over them, lie within 2½ miles south-westward of Kinabakbagan reef; a 4¾-fathom (8m7) patch and a 6¾-fathom (12m3) patch lie about 2 miles and 3¼ miles, respectively, southward of the shoalest part of Kinabakbagan reef.

Palauig reef, awash, on which the sea usually breaks heavily, lies with its north-eastern end about one mile westward of Palauig point. Between Kinabakbagan and Palauig reefs there are several shoals, with depths of from 2 to 5 fathoms (3m7 to 9m1) over them. A reef, with a least depth of 3 fathoms (5m5) over it, on which the sea breaks, lies about 1¼ miles north-westward of the northern extremity of Palauig point; there is a narrow channel between it and the coastal reef, with a least depth of 7 fathoms (12m8) in the fairway.

Palauig bay.—Dangers.—Palauig bay, entered between the northern extremity of Palauig point and a point about one mile north-north-eastward, affords good shelter in southerly and westerly winds, but is open north-westward.

The entrance channel between the reefs on either side is about 4 cables wide; inside the entrance the bay opens out slightly, but is much obstructed by shoals.

Salasa river discharges into the bay about half a mile from its southern entrance point; a narrow sand spit, which forms the south-eastern side of the bay, separates the river and bay for about three-quarters of a mile from its mouth.

The anchorage is, in depths of from 7 to 8 fathoms (12m8 to 14m6), sand, about 3½ cables eastward of the extremity of the reef on the southern side of the entrance.

Palauig town is situated on the southern side of the mouth of Salasa river; it is of little commercial importance.

Coast.—Dangers.—Between the northern entrance point of Palauig bay and Matalvi point (*Lat. 15° 29′ N., Long. 119° 54′ E.*), about 1¾ miles northward, the coast is fringed by a reef, which dries in places, extending from one to 4 cables offshore.

Chart 3559, plan of Port Masinloc and Port Matalvi.

A shoal, with a least depth of 5¾ fathoms (10m5) over it, lies about 9 cables offshore, 1¼ miles south-westward of Matalvi point.

Between Matalvi point and Bani point, about 4¾ miles northward, the coast forms a large bay, the greater part of which is obstructed by islands and reefs, but in which are the sheltered anchorages of Ports Matalvi, Masinloc and Oyon bay.

Port Matalvi.—Dangers.—Buoy.—Beacon.—The approach to Port Matalvi is between Magalawa island, situated about 6 cables north-north-westward of Matalvi point, and the southern side of Salvador island, about 9 cables north-eastward.

Magalawa (Macalaba) island is low, flat and wooded, with sandy beaches except on its western side; some native huts are situated on a sand spit near the eastern end of this island. Except on the eastern

Digitized by Google

Chart 3559, plan of Port Masinloc and Port Matalvi.

side the island is fringed by reefs, above water in places, which extend about 6½ cables from the northern and southern sides, and a bank, with depths of less than 5 fathoms (9m1) over it, extends about 8 cables south-westward.

Salvador island, the largest island in this vicinity, is thickly wooded, and rises, near its north-eastern end, to an elevation of 130 feet (39m6); Alupihing point, the north-western extremity of the island, sometimes known as Salvador head, is a prominent steep head, about 100 feet (30m5) high, and covered with bamboo. From the northern ridge the island slopes gradually towards the southern side.

Reefs and foul ground, with depths of less than 5 fathoms (9m1) over it, extend from 2 to 7 cables from the western side of the island and 4 cables (7m3) southward from the island. The island is connected to the mainland eastward by several islets, reefs and sandbanks, amongst which there are shallow channels navigable by boats with local knowledge.

For the northern side of Salvador island, *see* page 235.

Luan island, 118 feet (36m0) high near its northern end, lies on the reef which extends northward from Matalvi point. The reef, with a least depth of one fathom (1m8) over it, extends 4½ cables north-north-eastward from Luan point, the northern extremity of the island; it is marked at its outer end by a red conical buoy.

A shoal, with a least depth of 27 feet (8m2) over it, lies in the fairway about 4½ cables north-eastward of Luan point.

Matalvi island, about 100 feet (30m5) high, and wooded, lies half a mile eastward of Luan island; close eastward of it, and connected to it at low water by a reef, is another wooded island, 88 feet (26m8) high. These two islands form the northern side of Port Matalvi.

From Matalvi island (*Lat. 15° 29′ N., Long. 119° 55′ E.*) a reef, which dries in places, extends about 6 cables northward; Iagat islet, a low mangrove islet, lies on the eastern part of this reef.

A beacon, 25 feet high, consisting of a horizontal framework structure, 12 feet (3m7) square, painted white with a black centre, stands on the reef about 1¾ cables westward of Iagat islet.

Port Matalvi lies between Matalvi island, with the island eastward of it, on the north, and the mainland southward; it affords protection in any weather, and is important as being the only typhoon harbour between Port Olongapo (page 229) and Bolinao harbour (page 240) at the entrance to Lingayen gulf.

The southern shore of Port Matalvi is about 250 feet (76m2) high, and is fringed by a reef which extends about one cable offshore; southward of the eastern end of Matalvi island a spit, with a depth of less than 3 fathoms (5m5) over it, extends about 2 cables from the southern shore; reefs extend about 1½ cables from the northern shore of the port.

A shoal, with a depth of 15 feet (4m6) over it, lies on the northern side of the fairway about 1¼ cables southward of the south-western extremity of Matalvi island.

Anchorage.—Directions.—There is anchorage, in a depth of 15 fathoms (23m8), mud, in the channel midway between Luan and Matalvi islands, or southward of Matalvi island. Small craft can anchor near the eastern end of the port.

A vessel intending to enter Port Matalvi should steer for the beacon

Digitized by Google

Chart 3559, plan of Port Masinloc and Port Matalvi.

westward of Iagat island, bearing 120°. When the 118-foot (36^{m}0) hill on Luan island bears 225°, she should steer 195°, until the 118-foot (36^{m}0) hill on Luan island bears 285°, when she should keep in mid-channel to the selected anchorage. Vessels anchoring southward of Matalvi island should take care to avoid the 15-foot (4^{m}6) patch southward of the south-western extremity of Matalvi island, and the spit extending from the southern shore of the harbour.

Port Masinloc. — Dangers. — Beacons. — Buoys. — Port Masinloc, entered between Salvador island and Bani point, affords good shelter except from westerly winds.

A shoal, with a least depth of 33 feet (10^{m}1) over it, lies 9 cables north-westward of Alupihing point and a reef, parts of which dry, extends about 5½ cables north-north-westward from the same point.

A pair of white leading beacons, 18 feet (5^{m}5) high, on the northern side of Salvador island, are situated, respectively, about 4½ cables eastward and 6 cables east-south-eastward of Alupihing point. These beacons in line, bearing 136°, lead through the entrance.

The northern side of Salvador island is fringed by a reef, which extends about one cable offshore, and a bank, with depths of less than 3 fathoms (5^{m}5) over it, extends as much as 2¼ cables offshore; its outer edge is marked by a red conical buoy, No. 2, situated 7½ cables north-westward of Dalolac point, the eastern extremity of the island.

Bani point (chart 3806) has several rounded hills near its southern extremity, and a 79-foot (24^{m}1) knoll 4½ cables northward. The point is fringed with reefs, which extend about half a mile westward and 1½ miles south-south-eastward from it. A black can buoy, No. 3, is moored off the southern extremity of the latter reef.

A 28-foot (8^{m}5) patch lies about 1¾ miles northward of Alupihing point.

A detached reef, on the southern part of which is a group of rocks which are awash, lies in the entrance to Port Masinloc, about 7½ cables north-north-eastward of Alupihing point; the southern extremity of this reef is marked by a black can buoy, No. 1.

Reefs extend about three-quarters of a mile westward from Tagapolo point (*Lat. 15° 32′ N., Long. 119° 57′ E.*), situated on the southern side of the entrance to Masinloc river, about one mile north-eastward of Dalolac point, and are marked at their western edge by a pile beacon. Between this point and the south-eastern arm of the port the mainland is fringed by reefs, extending in places about half a mile offshore.

Between Tagapolo point and Oyon point, which is 125 feet (38^{m}1) high and bold, about 1½ miles north-north-westward, the coast is fringed by a reef, which extends from one to 4 cables offshore.

Oyon bay, the northern arm of the port, is entered from Port Masinloc between the reefs extending from Bani and Oyon points. The bay is sheltered from all winds, and has depths in the anchorage of from 7 to 8 fathoms (12^{m}8 to 14^{m}6), mud; its shores are fringed by reefs, which extend from one to 4 cables offshore, and are well marked by discoloration.

The small town of Masinloc stands on the southern side of the mouth of Masinloc river. The church, a large stone building with a corrugated iron gabled roof, and the convent, a long low white building with a nipa roof, which lies close northward of it, are both prominent.

Charts 3806, 2661b, 1263.

Digitized by Google

Chart 3559, plan of Port Masinloc and Port Matalvi.

The principal trade is in nipa and firewood.

A small wharf, with depths of from 32 to 36 feet (9m8 to 11m0) alongside its head, is situated about one mile south-eastward of Tagapolo point.

There is a pier, with a depth of 37 feet (11m3) alongside, with dolphins and two mooring buoys off it, about half a mile south-south-eastward of Oyon point.

Anchorage.—Directions.—There is anchorage, in depths of from 12 to 13 fathoms (21m9 to 23m8), sand, about 9 cables westward of the town.

A vessel bound for Port Masinloc should steer to bring the leading beacons on Salvador island in line, bearing 136°, before approaching within one mile of that island; she should keep on that alignment until Alupihing point bears about 230°, distant about 3 cables, when she should steer about 070° for the anchorage.

Chart 3806.

Coast.—Dangers.—A reef, with a depth of 1½ fathoms (2m7) near its outer end, extends about three-quarters of a mile west-north-westward from the northern part of Bani point.

Arenas point, which is low and sandy, lies about 3½ miles northward of Bani point, and midway between them Lauis river, which is navigable by small craft, discharges; a bank, with a depth of 2 fathoms (3m7) near its outer end, extends about three-quarters of a mile westward from the mouth of the river and a 2¼-fathom (4m1) patch lies about a quarter of a mile farther westward. A spit, with depths of less than one fathom (1m8) over it, extends about 4 cables north-westward from Arenas point.

Between Arenas point and Naulo point, a prominent thickly wooded point, 151 feet (46m0) high, about 4¾ miles northward, the coast forms a bay, which is encumbered with shoals and is of little importance. The town of Candelaria (Kandelaria) is situated near the southern end of this bay about 1½ miles eastward of Arenas point.

Pulipo islet, about half a mile offshore and 1½ miles south-eastward of Naulo point, is low and wooded; it is inconspicuous from seaward.

Between Naulo point (*Lat. 15° 42′ N., Long. 119° 54′ E.*) and Santa Cruz point, which is low and covered with mangroves, about 3 miles north-westward, reefs extend in places three-quarters of a mile offshore.

Off-lying dangers.—Tortuga reef, with a least depth of 2¾ fathoms (5m0) over it, lies about 1¾ miles west-south-westward of Arenas point.

A 3¼-fathom (5m9) patch lies about one mile westward of Arenas point.

Sabalay reef lies northward of Tortuga reef; a sand cay on its eastern part lies about 2¾ miles north-westward of Arenas point. Shoals, with depths of less than 5 fathoms (9m1) over them, extend about 1½ miles southward and 2½ miles north-westward from the cay.

Vessels without local knowledge, should not attempt to pass between Tortuga and Sabalay reefs unless the reefs are plainly visible, nor between these reefs and the coast.

There are several shoals, with depths of from 2 to 6½ fathoms (3m7 to 11m9) over them, between Sabalay reef and Naulo point and from 1½ to 5¾ fathoms (2m7 to 10m5) between Sabalay reef and Santa Cruz point; the positions of these shoals may best be seen on the chart.

Dasol bay.—Islands and dangers.—Light.—Dasol bay is entered

Digitized by Google

Chart 3806.

between Santa Cruz point and Caiman point, about 12 miles north-north-westward. The shores of this bay are low and are intersected by several rivulets; there are several unimportant small towns and villages, the principal of which are Santa Cruz, situated close to the south-eastern corner of the bay, and Infanta, about $3\frac{3}{4}$ miles northward.

Dasol bay is encumbered with islands and shoals, some of which are described below; it is of little importance to shipping.

Hermana Menor island, $2\frac{1}{4}$ miles westward of Santa Cruz point, is wooded, and rises from sandy beaches to an elevation of 54 feet (16^m5). The island is fringed by a reef, and a bank, with depths of less than 6 fathoms (11^m0) over it, extends about one mile from the south-eastern and north-eastern sides; on the former side there is a rock, awash, about $4\frac{1}{2}$ cables offshore. A rock, 10 feet (3^m0) high, lies on the fringing reef on the northern side of the island.

A $4\frac{1}{2}$-fathom (8^m2) patch lies about one mile west-south-westward of the southern extremity of Hermana Menor island, and several shoals, with depths of from 4 to $6\frac{1}{4}$ fathoms (7^m3 to 11^m4) over them, lie between the southern end of the island and Sabalay reef.

Between Hermana Menor island and Santa Cruz point there is a channel about half a mile wide, but it is not marked and should not be used without local knowledge.

Hermana Mayor, the largest island in the approach to Dasol bay, lies $2\frac{3}{4}$ miles north-westward of Hermana Menor; it is 130 feet (39^m6) high, and partly wooded. The island lies on a bank, with depths of less than 10 fathoms (18^m3) over it, which extends about $1\frac{3}{4}$ miles southward and 5 miles northward from it. The least depth on the southern part of the bank is a 3-fathom (5^m5) patch, situated about three-quarters of a mile south-south-eastward of the southern extremity of the island.

A spit, with a depth of $1\frac{1}{2}$ fathoms (2^m7) near its outer end, extends about half a mile eastward from the north-eastern extremity of Hermana Mayor island.

A reef, parts of which are above water, lies about $1\frac{1}{2}$ miles northward of Hermana Mayor island, and between them are several patches, with depths of less than 3 fathoms (5^m5) over them.

A light is exhibited, at an elevation of 157 feet (47^m8), from a white concrete tower and dwelling situated on the summit of Hermana Mayor island.

Culebra islet (*Lat. 15° 53′ N., Long. 119° 47′ E.*), situated near the northern end of the bank extending northward of Hermana Mayor, about 4 miles northward of that island, is low, with sandy beaches, and is covered with bushes. Foul ground, with depths of less than 5 fathoms (9^m1) over it, extends about $1\frac{3}{4}$ miles southward and three-quarters of a mile north-westward from this islet. The channel between the islet and Caiman point is deep and clear of dangers in the fairway.

Raton islet lies about $1\frac{1}{4}$ miles offshore, and $3\frac{1}{2}$ miles eastward of the north-eastern extremity of Hermana Mayor island. It is low, covered with bushes and has sandy beaches; it is surrounded by reefs, some of which dry, and which extend $1\frac{1}{4}$ miles north-north-eastward from its northern side.

Caiman point is rocky, and has two detached rocks close south-

Digitized by Google

Chart 3806.

eastward of it ; the outer rock is about 15 feet (4m6) high and steep-to. The point is fringed by a narrow reef, and a spit, with depths of less than 5 fathoms (9m1) over it, extends 6 cables south-south-eastward from it.

Santa Cruz harbour and approaches. — Dangers. — Buoy. — Beacons.—Santa Cruz harbour, entered between Santa Cruz point and a point about 2½ miles north-eastward, affords shelter to vessels with local knowledge from all except westerly winds.

A bank, with depths of less than 5 fathoms (9m1) over it, and with several rocks awash on its inner part, extends about 1½ miles north-westward from the northern side of Santa Cruz point. A 2¾-fathom (5m0) patch lies at the outer end of the bank. The northern edge of the bank extending from the southern shore of the harbour is marked by three beacons. A 2¼-fathom (4m1) patch lies about three-quarters of a mile northward of the northern side of Santa Cruz point, and a 5-fathom (9m1) patch, marked by a red conical buoy on its northern side, lies 2 cables farther northward.

A 2¼-fathom (4m1) patch lies about one mile eastward of the 5-fathom (9m1) patch, and is marked by No. 5 beacon. About a quarter of a mile farther eastward is another shoal, with a depth of 2¼ fathoms (4m1) over it, marked on its northern side by No. 6 beacon. A 2¾-fathom (5m0) patch lies close northward of this beacon, and a shoal, with a depth of about 4 feet (1m2) over it, lies about three-quarters of a cable south-eastward of the 2¼-fathom (4m1) shoal. A 4¼-fathom (7m8) patch lies about 4 cables north-north-westward of No. 5 beacon.

The town of Santa Cruz, on the eastern shore of the harbour, is of little commercial importance. There is a pier, alongside the head of which there was, in 1937, a depth of 30 feet (9m1), at Baluarte, about 1¼ miles south-westward of the town.

Anchorages.—Directions.—Anchorage may be obtained, in a depth of about 10 fathoms (18m3), half a mile north-westward of the head of the pier at Baluarte. Small vessels can anchor, in depths of from 5 to 6 fathoms (9m1 to 11m0), with the bell-tower, at the southern end of the town of Santa Cruz, bearing 077°, distant about three-quarters of a mile.

A vessel from southward should steer for the lighthouse on Hermana Mayor island, bearing 000°, until the 10-foot (3m0) rock close off the northern side of Hermana Menor, bears 096°, when she should steer for the highest part of a flat-topped mountain near the beach northward of Santa Cruz, bearing 060° ; the mountain can be further identified by a mountain behind it showing four distinct knobs ; this course leads through in a least depth of 14 fathoms (25m6). When the head of the wharf at Baluarte bears 123° she should steer for it on that bearing ; this course leads about three-quarters of a cable south-westward of the anchorage off the pier.

The small town of Infanta is situated on the southern side of a cove, about 2½ miles east-north-eastward of Raton islet (*Lat. 15° 49′ N., Long. 119° 52′ E.*). The cove affords good anchorage to vessels with local knowledge, in a depth of 7 fathoms (12m8), mud, sheltered by reefs. The entrance channel is deep, but narrow, with dangerous reefs on either side ; in a good light the northern reef can usually be distinguished by discoloration.

Tambove roads, the northern part of Dasol bay eastward of Bali-

Digitized by Google

Chart 3806.

manoc point, which lies about 1¾ miles east-north-eastward of Caiman point, affords good anchorage, in depths of from 6 to 13 fathoms (11m0 to 23m8), to vessels with local knowledge. The anchorage is open south-westward and there are several dangers in the entrance. Balimanoc point is a rocky bluff; it is fringed by reefs which extend about 3 cables southward from it, and a bank, with depths of less than 5 fathoms (9m1) over it, extends a further three-quarters of a mile.

Caiman cove, entered between Caiman and Balimanoc points, affords good anchorage to vessels with local knowledge, in a depth of 16 fathoms (29m3), during the North-east monsoon.

Coast.—Dangers.—Between Caiman point and Piedra point, about 23 miles northward, the coast is bold, rocky and wooded; it is indented in many places by small sandy bays. The fringing reef nowhere extends more than half a mile from this stretch of coast, and is steep-to. Tambobo point lies about 3¼ miles north-north-westward of Caiman point. Agno bay, entered between Saoit point, situated about 9 miles northward of Tambobo point, and Rena point, about 3 miles farther northward, is open westward.

A reef, with a depth of 2½ fathoms (4m6) near its outer end, on which the sea breaks, extends about 3 cables northward from Saoit point.

Balincaguin (Balinkaguin) river discharges into the southern part of Agno bay, about one mile north-eastward of Saoit point; the bar of this river has depths of about 5 feet (1m5), but at high water vessels drawing 7 feet (2m1) have ascended the river to the town of Agno, about 2 miles above its mouth.

During the North-east monsoon there is fair shelter for vessels with local knowledge eastward of Rena point, or off the mouth of Balincaguin river.

Olanin bay is situated at the mouth of Olanin river, about 4¾ miles north-north-eastward of Rena point. There is anchorage during the North-east monsoon for vessels with local knowledge, in a depth of 7 fathoms (12m8), in the middle of this bay, about 2½ cables offshore. There is a good landing place.

Cape Bolinao.—Light.—Cape Bolinao is the name given to the northern part of the peninsula which forms the western side of Lingayen gulf; it rises gradually from the coast to a moderate elevation, and is thickly wooded.

Piedra point (*Lat. 16° 19′ N., Long. 119° 47′ E.*), the western extremity of Cape Bolinao, is rocky, and wooded nearly to the beach; it attains an elevation of 240 feet (73m1) about three-quarters of a mile inland. In fine weather boats can land on a sandy beach close southward of the point.

Cape Bolinao light is exhibited, at an elevation of 301 feet (91m7), from a white circular concrete tower, with a red lantern, on Piedra point. *See* views facing pages 43 and 231.

The coast between Piedra point and Balingasay point, a low and wooded point, 7¾ miles north-eastward, is fringed by a reef, which dries, extending from about one cable offshore at Piedra point to 7 cables south-westward of Balingasay point.

Balingasay bay is a narrow opening in the reef about 2½ miles south-westward of Balingasay point. There is restricted anchorage in this bay for small vessels with local knowledge, but there is little turning room. Boats can land here in smooth water.

Charts 2661b, 1263.

Digitized by Google

Chart 3559, plan of Bolinao harbour, 3806.

Islands and dangers.—Santiago island, separated from the north-eastern side of Cape Bolinao by Bolinao harbour, is high and wooded. The northern and eastern sides of the island are fringed by a coral reef, which dries, and which extends as much as 1¾ miles offshore.

Silaqui islet, 71 feet (21m6) high, lies on the fringing reef about one mile north-north-westward of the 64-foot (19m5) bluff at the northern extremity of Santiago island. The islet appears wedge-shaped when seen from westward.

Dos Hermanos are three rocks, the highest and northernmost of which has an elevation of 57 feet (17m4), lying close westward of the 64-foot (19m5) bluff.

Tagaporo island, which is wooded, lies on the fringing reef, close off the eastern side of Santiago island, 1¾ miles northward of Siapar point, the south-eastern extremity.

A bank, with depths of less than 10 fathoms (18m3) over it, extends about 8 miles north-eastward from Santiago island; the shoalest spot, with a least depth of 3½ fathoms (6m4) over it, lies about 4 miles east-north-eastward of Dos Hermanos rocks, with a 6-fathom (11m0) patch at the outer end of the bank.

Chart 3559, plan of Bolinao harbour.

Bolinao harbour. — Light. — Dangers. — Bolinao harbour, situated between Santiago island and the north-eastern side of Cape Bolinao, is commercially unimportant, but it affords excellent shelter from all winds to vessels of moderate size. The harbour is entered from northward between Trinchera point, situated about one mile eastward of Balingasay point, and Ducoy, a village which stands on the western side of Santiago island, about one mile north-eastward.

Between Balingasay point and Trinchera point (*Lat. 16° 24′ N., Long. 119° 54′ E.*) the coastal reef extends about half a mile offshore. Outside the reef and within one mile of the coast there are several patches, with depths of less than 5 fathoms (9m1) over them, the positions of which can best be seen on the chart.

The small, unimportant town of Bolinao stands close south-westward of Trinchera point; very little of the town is visible.

The western coast of Santiago island between Ducoy village and Binabalian point, 130 feet (39m6) high, with a white cliff on its western side, the south-western extremity of the island, is fringed by a reef which extends about 2½ cables offshore at Ducoy to half a cable abreast the white cliff. A spit, with depths of less than 4 fathoms (7m3) over it, extends about 1¼ cables southward from Binabalian point.

A light is exhibited, at an elevation of 85 feet (25m9), from a white concrete pillar with a square topmark, on the southern shore of the harbour about 3½ cables south-south-eastward of Binabalian point.

From Binabalian point the channel, with depths of not less than 38 feet (11m6) in the fairway, trends eastward for about one mile, and thence southward for the same distance to Panaen islet, 95 feet (29m0) high, south-eastward of which it opens out and becomes shoaler.

A narrow and winding channel, with a least depth of 6 feet (1m8), which is used by local boats, leads from the head of Bolinao harbour westward of Narra, Siapar and Cabarruyan islands (page 241) to the head of Lingayen gulf.

Anchorage.—Directions.—Vessels can anchor, in depths of from

Digitized by Google

Chart 3559, plan of Bolinao harbour.

9 to 10 fathoms (16m5 to 18m3), mud, in mid-channel westward of Binabalian point, but this anchorage is exposed to northerly winds.

Vessels can also anchor in mid-channel, eastward or westward of Riripayan point, situated on the southern shore, about half a mile eastward of Binabalian point.

A vessel approaching Bolinao harbour from northward should keep the extremity of Cape Bolinao bearing less than 220° until Bolinao harbour light-structure bears 153°, when she should steer for it on that bearing, which leads midway between the reefs on either side; when Trinchera point bears 243°, she should keep in mid-channel to the anchorage. If the vessel is proceeding to the anchorages eastward of Binabalian point she should give that point a berth of about 2 cables to avoid the spit extending from it, and thence keep in mid-channel.

Chart 3806.

LINGAYEN GULF.—Aspect.—Lingayen gulf, entered between Santiago island and San Fernando point, about 23 miles east-north-eastward, is open northward.

The land on the western side of the gulf is of moderate elevation, gradually rising from Cape Bolinao to the mountains southward.

Eastward of the gulf is a range of mountains, the highest summit of which, Mount Santo Tomas, 7,407 feet (2,257m6) high, is situated about 24 miles south-eastward of San Fernando point.

Vessels entering or leaving the gulf should not approach Silaqui islet within a distance of 8 miles.

Western side of Lingayen gulf. — Coast. — Islands and dangers.—The western side of Lingayen gulf from Riripayan point to the mouth of Agno river, about 24 miles south-eastward, is fronted by an almost continuous chain of islands and rocks as far as Cabalitian (Kabalitian) island, situated about 4¼ miles northward of the mouth of Agno river. These islands are mostly low and wooded, and are separated by shallow channels, which are available only to small vessels with local knowledge.

Cabarruyan (Kabarruyan) island, wooded and of moderate elevation, lies eastward of Cape Bolinao, with Carot point, its northern extremity, situated about 2 miles south-eastward of Siapar point. It is separated from the western shore of the gulf by Caquiputan strait, which is narrow, and the approaches to which are very shallow.

Cangaluyan island (*Lat. 16° 22′ N., Long. 119° 59′ E.*) lies about 3 cables northward of Carot point, and Siapar and Narra islands lie about a quarter of a mile and 1¾ miles, respectively, south-south-westward of Siapar point. The northern and eastern sides of Cabarruyan are fringed by a reef which extends about 2 miles offshore. Tandoyong and Panacalan islets lie on the fringing reef on the eastern side of the island.

Tombac bay, a narrow inlet south-westward of Cabarruyan island, is shallow. Hundred islands are a group of wooded islets extending about 2 miles north-north-eastward from a point on the mainland about 2¾ miles south-eastward of Toritori point, the southern extremity of Cabarruyan island; the bases of these islands are much undermined by the action of the sea, and landing on them is difficult. A 5½-fathom (10m1) patch lies about one mile east-north-eastward of the northern islet of the group.

Charts 2661b, 1263.

Digitized by Google

Chart 3806.

There is good anchorage, in depths of from 6 to 8 fathoms (11m0 to 14m6), for vessels with local knowledge, close westward of the Hundred islands.

Between Encarnada point, about 5 miles south-eastward of Toritori point, and Bangar point, 3¼ miles south-eastward, the coast is fringed by a bank, with depths of less than 5 fathoms (9m1) over it, which extends as much as 4½ cables offshore. Comas islet lies about a quarter of a mile offshore about half a mile north-eastward of Bangar point; it is connected to the coast by a reef which dries. A rock, above water, lies close south-eastward of the islet.

Chart 3545, plan of Port Sual with Cabalitian bay.

Pao bay is entered between Bangar point and Bangayao point, about 7 cables south-south-westward. A reef, with depths of less than 2 fathoms (3m7) over it, extends about 3 cables southward from Bangar point, and a shoal, with a least depth of 9 feet (2m7) over it, lies in mid-channel 2¾ cables west-south-westward of the same point. The head of the bay is shallow.

There is good sheltered anchorage in Pao bay for small vessels with local knowledge, in depths of from 4 to 5 fathoms (7m3 to 9m1).

Cabalitian island, 346 feet (105m5) high, and wooded, lies about 4¼ cables south-eastward of Bangayao point. The island is fringed by a reef, on which there are some islets, and a bank with depths of less than 5 fathoms (9m1) over it, extends about 4 cables north-eastward from it.

Cabalitian bay.—Dangers.—Cabalitian bay, entered between the southern extremity of Cabalitian island and a point about one mile south-south-westward, affords good shelter, protected from north-eastward by Cabalitian island.

Calpay shoal, steep-to, and awash near its southern end, lies with its shoalest part about half a mile southward of the southern extremity of Cabalitian island (*Lat. 16° 07′ N., Long. 120° 07′ E.*), from which it is separated by a channel about one cable wide.

A shoal, with a least depth of 16 feet (4m9) over it, lies about 2½ cables southward of Bangayao point.

The western shore of Cabalitian bay is fringed by a bank, with depths of less than 3 fathoms (5m5) over it, which extends as much as 5½ cables offshore.

Anchorage.—Directions.—The best anchorage is, in a depth of 13 fathoms (23m8), about 2½ cables southward of the south-western extremity of Cabalitian island.

A vessel entering Cabalitian bay from northward should keep Bangayao point bearing 229°, until the islet about one cable north-westward of Cabalitian island bears 139°, when she should steer to pass about 1¾ cables south-eastward of Bangayao point, and between the reef extending westward from Cabalitian island and the 16-foot (4m9) shoal southward of Bangayao point. When the south-western extremity of Cabalitian island bears 114°, she should alter course south-eastward for the anchorage.

A vessel entering from eastward and southward should pass southward of Calpay shoal.

Port Sual.—Dangers.—Port Sual, situated in the south-western corner of Lingayen gulf, is entered between Portuguese point, situated

Digitized by Google

Chart 3545, plan of Port Sual with Cabalitian bay.

about one mile south-south-eastward of the southern entrance point of Cabalitian bay, and Mangas point, about 6½ cables southward.

Portuguese point, 240 feet (73m2) high, and wooded, can be identified by a small tower which forms part of an old fort. From a distance of more than 7 miles the land in the vicinity of the point appears like an island.

A reef, with a depth of 17 feet (5m2) at its outer end, on which the sea only breaks in strong onshore winds, extends about 2¼ cables southward from Portuguese point.

Mangas point is 131 feet (39m9) high, and wooded; it is fringed by a reef, which extends about 1¾ cables northward from it. A group of rocks, above water, lies on the northern part of the reef, the outer rock being situated about 1½ cables north-eastward of the point.

Adela rock, with a least depth of 9 feet (2m7) over it, lies on the southern side of the approach to Port Sual, about 5½ cables eastward of the northern extremity of Mangas point. The sea breaks on the rock in heavy weather.

The shores of Port Sual are fringed with reefs which extend as much as 4 cables from its western side.

The town of Sual is situated near the south-western corner of the port. There is a small pier here, with a depth of 3 feet (0m9) at its head, and there is frequent steamer communication with Manila.

Anchorage.—Directions.—Vessels may obtain anchorage, in a depth of about 6 fathoms (11m0), mud, about 4 cables 226° from the old tower on Portuguese point. Small vessels can anchor, in depths of 5 fathoms (9m1), in the basin nearly half a mile north-westward of the old tower.

A vessel approaching Port Sual from northward should pass at least a quarter of a mile eastward of Portuguese point, and continue southward until Sual church bears 264°, when she should steer for it on that bearing. When the eastern rock off Mangas point bears 174° she should alter course for the anchorage.

A vessel entering from eastward should take care to avoid Adela rock.

Chart 3545, plan of San Fernando harbour.

Eastern side of Lingayen gulf.—Coast.—Dangers.—Light.—Beacons.—San Fernando point is the extremity of a peninsula, 80 feet (24m4) high on its western side, where there are some prominent white cliffs. A bank, with depths of less than 3 fathoms (5m5) over it, extends about 1½ cables from the western side of the peninsula.

A light (*Lat. 16° 37′ N., Long. 120° 17′ E.*) is exhibited, at an elevation of 107 feet (32m6), from a white circular iron tower with a dwelling attached about 6 cables southward of the extremity of San Fernando point. *See* view facing page 43.

A wooden signal tower, which must not be confused with the lighthouse, stands on San Fernando point close to the lighthouse.

Charts 3805, 3806.

The eastern side of Lingayen gulf between San Fernando point and the sandy western entrance point of Santo Tomas anchorage, about 23 miles southward, consists of a continuous sandy beach with foothills a short distance inland. Between a point, situated about 2¾ miles south-south-eastward of San Fernando point, and Bauang point, about 3¾ miles farther southward, a bank, with depths of less than 3 fathoms (5m5) over it, extends about one mile offshore.

Charts 3806, 2661b, 1263.

Digitized by Google

Charts 3805, 3806.

There are several beacons on the coast between San Fernando point and Bauang point.

Between Bauang point and a position about 1½ miles northward of the western entrance point of Santo Tomas anchorage there are no dangers outside the coastal bank. Bauang river discharges on the southern side of Bauang point, and a spit, with a depth of 3 fathoms (5m5) over its outer end, extends about 4 cables offshore.

Off-lying dangers.—Research reef, with a least depth of 2½ fathoms (4m6) over it, coral, lies 8½ cables offshore and about 2½ miles southward of San Fernando point; a 2¾-fathom (5m0) patch lies about three-quarters of a mile southward of Research reef.

Santo Tomas anchorage.—Santo Tomas anchorage, which is of no commercial importance, is formed by a sand spit, with depths of from 1½ to 3 fathoms (2m7 to 5m5) over it, which extends about 4 miles southward from the extremity of its western entrance point. The southern and eastern sides of the spit are steep-to, but the western side shoals gradually. Owing to the depths over it the spit affords little protection.

The head of Santo Tomas anchorage, northward of the end of the sandy point, is shallow.

The best anchorage is, in a depth of 7 fathoms (12m8), mud, about one mile south-eastward of the extremity of the sandy point.

The town of Santo Tomas is situated near the eastern side of the head of the harbour; it is connected to the railway system.

The coast between Santo Tomas and San Fabian, about 9½ miles southward, consists mostly of a sandy beach backed by sparsely wooded hills, about 300 feet (91m4) high, and is fringed by a bank, with depths of less than 5 fathoms (9m1) over it, which extends from about three-quarters of a mile to 1¼ miles offshore.

The town of San Fabian is connected to the railway system.

Head of Lingayen gulf.—The southern shore of Lingayen gulf is formed by the delta of the Agno and other rivers; it is very low and sandy.

Mount San Isidro, a wooded conical mountain, 2,627 feet (800m7) high, is situated near the western end of this stretch of coast, about 4¼ miles southward of Mangas point (*Lat. 16° 04′ N., Long. 120° 06′ E.*).

Agno river discharges into the head of the gulf about 2 miles east-south-eastward of Mangas point; it has a bar, on which there is a least depth of 3½ feet (1m1). Small vessels with local knowledge can ascend the river to a point a little above the town of Labrador, situated on the western bank about 1½ miles from its mouth.

Lingayen, the principal town of the province of Panga Sinan, stands about three-quarters of a mile inland, nearly 5 miles eastward of Labrador; the provincial building in the town is an excellent landmark.

Dagupan river.—Light.—Dagupan river discharges about 6½ miles east-north-eastward of the town of Lingayen; the bar at its mouth shifts frequently, but generally has a least depth of 6 feet (1m8) over it. Above the bar there are depths of from 8 to 14 feet (2m4 to 4m3) in the fairway. Small craft can ascend the river to Lingayen.

A light is exhibited, at an elevation of 47 feet (14m3), from a white concrete house on Guecet point, the eastern entrance point of the river.

The town of Dagupan, situated about 2 miles above the bar, is connected to the railway system.

Charts 2661b, 1263.

Digitized by Google

Charts 3805, 3806.

Anchorage.—There is anchorage, in depths of 6 fathoms (11m0), sand, off the mouth of the river about one mile north-westward of the light-structure.

Pilotage.—Pilotage is compulsory for all merchant vessels of 5 tons register tonnage or over entering the river; pilots can be obtained by sounding the whistle.

Coast.—Beacons.—Between the mouth of Dagupan river and San Fabian, about 5 miles north-eastward, the coast continues low, and is fronted by a bank, with depths of less than 5 fathoms (9m1) over it, which extends as much as about one mile offshore.

Four white beacons stand on the coast between the mouth of Dagupan river and a position about 8 miles north-eastward.

Chart 3545, plan of San Fernando harbour.

San Fernando harbour. — Dangers. — Buoys. — Lights. — Fernando harbour is formed by the peninsula of which San Fernando point is the extremity, and is entered between that point and a point on the mainland about 1¾ miles east-north-eastward; it is open to north-westerly winds.

Fagg reef, composed of rock and sand, with a least depth of 27 feet (8m2) over it, on which the sea breaks in heavy weather, lies on the western side of the approach to San Fernando harbour, about 2 miles north-westward of San Fernando point.

From the eastern side of San Fernando point a rocky ledge, with depths of less than 5 fathoms (9m1) over it, extends nearly one mile north-eastward; the outer end of this ledge is marked by a red mooring buoy.

A flat, with depths of less than 5 fathoms (9m1) over it, marked at its outer edge by a black can buoy, extends about 4 cables from the eastern entrance point of the harbour.

A rock, with a depth of less than 6 feet (1m8) over it, lies about 1¼ cables west-south-westward of the front leading light-structure.

The village of Carlatan is situated at the entrance to Carlatan lagoon, about half a mile south-eastward of the eastern entrance point of the harbour. There is a large warehouse here, and a pier, 1,000 feet (304m8) long, which is the best landing place in the harbour during the North-east monsoon. This pier was reported, in 1950, to be in a dilapidated condition, and only the inner berth on the western side could be used.

The village of Poro stands on the low isthmus near the south-western corner of the harbour. There are two piers here, neither of which has a landing place for boats. The western pier is too shallow alongside for use of vessels.

In 1950, it was reported that the eastern pier was damaged near its head, where there is also a wreck.

Leading lights are shown near the town of San Fernando, situated on the south-eastern side of the harbour. The front light is exhibited, at an elevation of 21 feet (6m4), from a white post surmounted by a white diamond shape, near the shore about 2 miles eastward of San Fernando point lighthouse (*Lat. 16° 37′ N., Long. 120° 17′ E.*). The rear light is exhibited, at an elevation of 110 feet (33m5), from a white post surmounted by a white triangle, point up, situated about 3½ cables south-eastward of the front light.

Pilotage.—Pilotage is compulsory for merchant vessels.

Charts 2661b, 1263.

Digitized by Google

Chart 3545, plan of San Fernando harbour.

The leading lights and structures were reported, in 1949, to be difficult to distinguish and the lights could not be seen from the channel even on a clear night.

Anchorages.—Directions.—There is good anchorage, in depths of from 8 to 9 fathoms (14^{m}6 to 16^{m}5), westward of San Fernando. During the North-east monsoon the swell reaches this anchorage, and is particularly heavy in the afternoon.

There is also anchorage, in depths of from 7 to 8 fathoms (12^{m}8 to 14^{m}6), mud, off Poro. This anchorage affords some shelter from strong northerly winds and the holding ground is good; during these winds vessels lie more easily here than off San Fernando.

A vessel approaching San Fernando harbour from southward should use the channel between Fagg reef and San Fernando point, passing about one mile northward of the latter. When the leading light structures are in line, bearing 144°, she should keep them in line, which leads between the buoys marking the reefs at the entrance; when San Fernando point lighthouse (*Lat. 16° 37′ N., Long. 120° 17′ E.*) bears 226°, course should be altered as requisite for the anchorage.

A vessel entering from northward should keep San Fernando point lighthouse bearing 180° until the leading light structures are in line whence she should follow the above directions.

The quarantine anchorage is north-eastward of the leading line, and south-westward of the old fort, situated about one mile northward of the front leading light-structure.

Caution.—There are numerous wrecks in the harbour which may break up in heavy weather and form new obstructions, and there is a large amount of flotsam on the beaches, which, at high water with a southerly wind, may come afloat and become dangerous to navigation.

There are several red and black buoys marking obstructions in the harbour, the positions of which may be seen on the chart. A pile is situated about 6 cables west-south-westward of the front leading light-structure and about 2 cables offshore.

San Fernando.—The town of San Fernando is a place of some importance. It is connected to the telegraph system, and there is regular steamer communication with coastal ports.

There are no wharves, but lighters are available.

Fresh provisions may be obtained.

Charts 3805, 3806, 2661b, 1263.

Digitized by Google

CHAPTER XII

WEST COAST OF LUZON FROM SAN FERNANDO HARBOUR TO CAPE BOJEADOR; ALSO REEFS IN THE NORTHERN PART OF THE CHINA SEA

Chart 3805.

COAST.—Dangers.—Between the eastern entrance point of San Fernando harbour and Darigayos point, about 12 miles northward, the coast is fringed by a bank, which extends in places 3½ cables offshore. A one-fathom (1m8) patch lies about 2 cables offshore and three-quarters of a mile northward of San Juan, a town situated about 3¼ miles north-north-eastward of San Fernando. Maragaya river discharges 5½ miles northward of San Juan.

Climate and weather.—*See* page 22.

Darigayos inlet.—Dangers.—Darigayos inlet is a slight indentation in the coast, into which Darigayos river discharges, and is entered about one mile southward of Darigayos point. There is an old fort on the southern entrance point of the inlet; about 2 cables eastward of the fort is a bluff, which is 85 feet (25m9) high.

Reefs, parts of which dry, extend about 2¾ cables west-north-westward from the southern entrance point, and 3¼ cables westward from the northern entrance point of the inlet. Pin rock (*Lat. 16° 49′ N., Long. 120° 20′ E.*), 2 feet (0m6) high, lies near the southern edge of the latter reef.

The village of Darigayos stands on the northern side of the inlet; near the northern end of the village is an old stone warehouse with an iron roof.

There is anchorage for small craft, in a depth of 10 feet (3m0), sand, about one cable from the head of the inlet, but it is poorly protected and is of no commercial importance.

Coast.—Lights.—Between the northern entrance point of Darigayos inlet and Darigayos point the coast is fringed by a narrow reef and a bank, with depths of less than 3 fathoms (5m5) over it, which extends about 3 cables offshore. Darigayos point is low, covered with trees and fringed by a narrow reef. Between this point and the northern mouth of Amburayan river, about 9 miles north-eastward, are the small towns of Luna, in which there is a church with three towers, about 2½ miles east-north-eastward of Darigayos point, Bangar, about 3½ miles farther north-eastward, and Tagudin, 2½ miles north-north-eastward of Bangar.

Tagudin light is exhibited, at an elevation of 26 feet (7m9), from a white concrete pillar, about 2½ cables north-eastward of the northern entrance to Amburayan river.

Charts 2661b, 1263.

Digitized by Google

Chart 3805.

Vessels with local knowledge may obtain anchorage off Tagudin light-structure, in a depth of 8 fathoms (14m6), sand and mud, with the light-structure bearing 135°.

Between Tagudin light-structure and Candon (Kandon) point, 15½ miles northward, are the small towns of Santa Cruz and Santa Lucia, about 8 and 10 miles, respectively, northward of Tagudin light-structure; in Santa Lucia there is a prominent church with a white dome. The town of Candon (Kandon) stands about 2¾ miles south-eastward of Candon point, which is low, densely wooded with coconut trees, and fringed by a narrow reef.

A light (*Lat. 17° 12' N., Long. 120° 25' E.*) is exhibited, at an elevation of 48 feet (14m6), from a white concrete structure, one mile south-eastward of Candon point.

There is anchorage for vessels with local knowledge southward of Candon point, in depths of not less than 9 fathoms (16m5), with the extremity of the point bearing 000°. Small vessels can anchor, in depths of from 5 to 6 fathoms (9m1 to 11m0), west-south-westward of a stone house, situated on the beach about one mile south-eastward of the extremity of the point. The anchorage is partly protected from northerly winds, but, when they are strong, the swell comes in round the point causing a heavy surf, and rendering the landing of cargo difficult and, at times, impossible.

Current.—During the North-east monsoon, a strong current has sometimes been experienced setting north-north-eastward along this coast.

Coast.—Tamurung point, 100 feet (30m5) high, lies 2¾ miles north-north-eastward of Candon point. Between a position about one mile southward of Tamurung point and the southern entrance point of Santiago cove, about 1½ miles northward of Tamurung point, the coast is fringed by a reef which extends about 1½ cables offshore. A coral islet lies on this reef about half a mile southward of the entrance to the cove.

Santiago cove.—Dangers.—Santiago cove affords fair shelter during the North-east monsoon, but is open south-westward.

The sides of the cove are fringed with reefs which extend as much as three-quarters of a cable offshore, and which are usually plainly visible.

At the head of the cove there is a sandy beach, near the southern end of which a rivulet discharges; the bar at the mouth of this rivulet has depths of about 3½ feet (1m1) over it.

The village of Sabangan stands on a spit between the rivulet and the head of the cove.

The town of Santiago is situated about half a mile north-eastward of the head of the cove; only the church and monastery in it are visible from seaward.

Anchorage. — Directions. — There is anchorage, in a depth of 6½ fathoms (11m9), sand and mud, with the northern entrance point bearing about 320°.

Small vessels can anchor, in a depth of 2 fathoms (3m7), within 1¼ cables of the head of the cove, but the swinging room here is very restricted.

Vessels entering the cove should keep Santiago church bearing 067°, and anchor as directed above.

Coast.—The coast between Santiago cove and San Esteban point,

Charts 2661b, 1263.

Digitized by Google

Chart 3805.

3 miles northward, is high and fringed by a reef, which extends from one to 2 cables offshore.

Port San Esteban.—Dangers.—Port San Esteban, entered between San Esteban point and Suso point, about 1½ miles north-eastward, affords shelter to small craft in the South-west monsoon ; it is a dangerous anchorage during the North-east monsoon, on account of the heavy swell.

Suso shoal, with a least depth of 21 feet (6m4) over it, coral, lies in the entrance to the port from 2 to 8½ cables westward of Suso point ; the shoal affords no protection to the anchorage.

On either side of the port reefs extend as much as 1½ cables offshore, and there is a sandy beach at its head.

A quarry, situated about 4½ cables southward of Suso point (*Lat. 17° 21′ N., Long. 120° 27′ E.*), which appears as two bare spots on the hillside, is prominent ; a stone tower on the south-western side of the entrance about three-quarters of a mile east-north-eastward of San Esteban point, and the hospital, a large stone building close to the beach at the head of the port, are also prominent.

There is a small mole, with a depth of 11 feet (3m4) at its head, at the head of the cove.

Moderate-sized vessels can anchor, in depths of from 8 to 9 fathoms (14m6 to 16m5), about 3¾ cables northward of the stone tower, or about one cable farther eastward, with the hospital bearing 169°. Small vessels with local knowledge can anchor between the reefs near the head of the port.

Vessels should approach the anchorage with the quarry, bearing 090°.

Nalvo bay.—Nalvo bay, entered between Suso point and a point about three-quarters of a mile north-north-eastward, is open to the South-west monsoon. It affords some shelter during the North-east monsoon, when it is preferable to Port San Esteban.

A coral reef extends about 1¾ cables westward from the northern entrance point of the bay, and a spit, with a depth of 3½ fathoms (6m4) near its outer end, extends the same distance beyond the edge of the reef. Boats can land on the sandy beach close eastward of the reef.

At the head of the bay there is a sandy beach, close inland of which rises a solitary pointed hill, about 250 feet (76m2) high.

There is anchorage, in depths of from 5 to 6 fathoms (9m1 to 11m0), hard sand, in the northern part of the bay.

A vessel should enter with the solitary pointed hill bearing about 079° ; Santa Maria church will then be seen in line with the lower part of the northern slope of this hill, and she should anchor when the point of land northward of the northern entrance point comes in line with Solvec rock (page 250), bearing about 349°.

Coast.—Between the northern entrance point of Nalvo bay and the mouth of Mainganay river, about one mile north-north-eastward, the coastal bank, with depths of less than 3 fathoms (5m5) over it, extends as much as 3½ cables offshore. About half a mile northward of the northern entrance point of Nalvo bay are some hills, which rise to an elevation of 409 feet (124m7).

There is anchorage for small craft, with local knowledge in a break in the reef close southward of the mouth of Mainganay river.

Charts 2661b, 1263.

Digitized by Google

Chart 3545, plan of Solvec cove.

Solvec cove.—Dangers.—Solvec cove is entered between Solvec point, about 5¾ miles northward of Suso point, and a point about one mile south-eastward. It is of little commercial importance, but affords shelter from northerly winds.

The cove can be identified by Mount Narvacan, 851 feet (259m4) high, situated about 6 cables eastward of the southern entrance point, and by the long ridge of hills extending north-north-eastward from Solvec point for about 5 miles to the Tetas de Santa, prominent twin peaks (chart 3805), 2,134 feet (650m4) high.

From the southern entrance point of the cove a reef, which partially dries, extends about 2¾ cables north-westward ; a group of rocks, with depths of less than 6 feet (1m8) over them, lies about three-quarters of a cable westward of the extremity of this reef. A pier extends about 1¼ cables west-north-westward from a position on the eastern shore of the cove, about three-quarters of a cable north-eastward of the northern edge of the reef.

Solvec rock (*Lat. 17° 27′ N., Long. 120° 26′ E.*), square shaped and 30 feet (9m1) high, and prominent, lies close offshore south-westward of Solvec point, to which it is joined by rocks above water. A rock, awash, lies close westward of Solvec rock.

From the northern shore of the cove a reef, which dries in places, and foul ground extend as much as 1½ cables offshore. An old tower stands close to this shore about 4½ cables eastward of Solvec point. A shoal, with a least depth of 3 fathoms (5m5) over it, lies about one cable north-westward of the head of the pier.

The head of the bay consists of a sandy beach. The village of Solvec is situated about a quarter of a mile inland from the north-eastern corner of the cove.

Anchorage.—Directions.—There is anchorage, in depths of from 10 to 12 fathoms (18m3 to 21m9), soft mud, about 4½ cables south-eastward of Solvec rock. Small vessels can anchor nearer the head of the cove, but the holding ground there is not good.

Vessels entering should steer for the largest house in the village, which has a prominent iron roof, in line with a rounded hill with two prominent trees on its summit, about 8 miles inland, bearing 062°. Large vessels should anchor when Solvec rock bears 315° and the old tower on the northern shore of the cove 023°. Small vessels proceeding farther in should continue on the same leading line and anchor as requisite.

Chart 3805.

Aspect.—From Solvec point (*Lat. 17° 27′ N., Long. 120° 26′ E.*) a range of mountains extends about 24 miles north-north-eastward, terminating at Mount Nagapu, 4,174 feet (1,272m2) high, and flat topped ; the greatest elevation in the vicinity of this mountain is inconspicuous, being largely obscured by a high ridge nearer the coast.

Vigan gap, situated about 7 miles north-north-eastward of Solvec point, is a prominent divide in the mountain range, through which the Abra river flows.

Mount Bulagao, situated about 11 miles south-south-westward of Mount Nagapu, is dark coloured, and prominent on account of its comparative isolation. When seen from northward it appears as a rounded summit, but from southward two summits are visible, the northern of which rises to an elevation of 3,679 feet (1,121m4).

Charts 2661b, 1263.

Digitized by Google

Chart 3805.

Coast.—Dangers.—Light.—Between Solvec point and the town of Santa (Pasungol), about 2 miles northward, the coast is high, the ridge extending northward rising to an elevation of 700 feet (213m4) about a quarter of a mile inland.

From Santa to Dile point, about 8 miles north-westward, the coast, which is low, consists of the delta of the Abra, and other rivers; from it the coastal bank, with depths of less than 6 fathoms (11m0) over it, extends as much as three-quarters of a mile offshore.

Pandan village is situated near one of the mouths of Abra river, about 3 miles south-eastward of Dile point; it is the landing place for the important town of Vigan, which stands about 2½ miles north-north-eastward.

A white cylindrical water tower, the top of which has an elevation of 181 feet (55m2), stands on a hill close south-westward of Vigan, and is a prominent landmark.

Caoayan village stands about one mile north-eastward of Pandan; the white concrete belfry of the church shows above the trees and is prominent.

A light is exhibited, at an elevation of 41 feet (12m5), from a white concrete tower on the beach near Pandan village.

The channels leading into Abra river are constantly changing both in position and depth, especially during the season of freshets and the South-west monsoon. A depth of 5 feet (1m5) can sometimes be carried over the bar, but local knowledge is necessary for entering.

Dile point is low and inconspicuous; discoloured water, due to the discharge from Abra river, is sometimes to be seen off this point.

Two shoals, each with a least depth of 4½ fathoms (8m2) over it, lie about one mile offshore, and are situated, respectively, about 3 miles and 2¼ miles south-south-eastward of Dile point.

Anchorage.—Directions.—There is anchorage off Pandan village for vessels with local knowledge, partially sheltered from north-east winds by Dile point; in strong northerly winds the ground swell sets in round the point, causing a heavy surf, and rendering the loading of cargo difficult, and at times, impossible. At such times this anchorage is very uncomfortable as, with the northerly set of the current, vessels lie broadside to the sea.

Vessels can anchor, in a depth of 6 fathoms (11m0), sand, about three-quarters of a mile south-westward of the light-structure, with Caoayan church bearing 041°, and Solvec rock (page 250) 140°.

Vessels approaching the anchorage from either southward or northward should keep about 2 miles offshore until Caoayan church comes in line with a prominent shoulder on the western side of Mount Bulagao, about 9½ miles north-eastward, bearing 041°, when it should be steered for on that bearing to the anchorage.

Tide-rips extend from the southern mouth of Abra river to northward of Dile point (*Lat. 17° 34′ N., Long. 120° 20′ E.*), giving a dangerous appearance to the anchorage.

Climatic table.—For Climatic table for Vigan, *see* page 41.

Coast.—Dangers.—Between Dile point and Pinget island, about 6½ miles northward, the coast is low and sandy; from it the coastal bank, with depths of less than 3 fathoms (5m5) over it, extends as much as 3 cables offshore. From a point about 4 miles northward of Dile point a reef extends about a quarter of a mile north-westward.

Charts 2661b, 1263.

Digitized by Google

Chart 3805.

San Ildefonso harbour is situated about 4¾ miles north-north-eastward of Dile point. There is a pier here which extends about 2½ cables north-westward from the coast.

A shoal, with a least depth of 5 feet (1m5) over it, coral, lies with its shoalest part about half a mile north-westward of the pier head, from which it is separated by a channel 1½ cables wide, with a least depth of 4¾ fathoms (8m7); this channel should not be attempted without local knowledge.

An old fort is situated on a point about 9 cables south-eastward of the southern extremity of Pinget island; reefs extend about 1½ cables offshore from this point.

Pinget island, 20 feet (6m1) high near its southern end, is sandy and covered with brushwood; it is fringed by a reef, and is joined to the mainland about half a mile eastward by a low sandy isthmus.

Vessels with local knowledge can anchor either southward or northward of Pinget island, according to the monsoon. The anchorage on the southern side is, in a depth of 6 fathoms (11m0), about midway between its southern point and the old fort on the mainland mentioned above. Off the northern side there is good anchorage, in a depth of 7 fathoms (12m8), about 3 cables eastward of its northern end; small vessels can anchor closer in.

The coast between the point which is connected to Pinget island and Lapog point, about 4 miles north-eastward, is fringed by reefs which extend half a mile offshore in places.

Chart 3545, plan of Salomague harbour and Lapog bay.

Lapog bay.—Dangers.—Lapog bay, entered between Lapog point and Darrena point, about 2 miles north-north-westward, affords shelter to small craft with local knowledge, but in view of its proximity to Salomague harbour (page 253), which affords better shelter and holding ground, it is not recommended. Several small villages are situated near the shores of this bay.

From Lapog point (*Lat. 17° 44′ N., Long. 120° 25′ E.*) a spit, with depths of less than 3 fathoms (5m5) over it, extends 6 cables west-southwestward; a shoal, with a least depth of 13 feet (4m0) over it, lies about 1¼ miles westward of the point, and a 4-fathom (7m3) patch lies about one cable south-westward of this shoal.

The southern shore of the bay eastward of Lapog point is fringed by coral reefs, parts of which dry, and which extend as much as 1½ cables offshore. There is a break in the reef about half a mile eastward of Lapog point, leading to a sandy beach, near which is situated the village of Saoang, the port for the town of Lapog which stands about one mile inland.

Darrena point is low, and covered with trees and brushwood; it is fringed by a coral reef, most of which dries, and which extends as much as 3 cables from its southern side. A spit, with depths of less than 5 fathoms (9m1) over it, extends about 6 cables westward from the point.

Lapog shoal, with a least depth of 7 feet (2m1) over it, lies with its shoalest part about one mile southward of Darrena point, from which it is separated by a channel about 3 cables wide.

A detached reef, which dries, lies in the north-eastern corner of the bay about 3 cables offshore; a 15-foot (4m6) patch lies between its western end and the northern shore of the bay.

Charts 2661b, 1263.

Digitized by Google

Chart 3545, plan of Salomague harbour and Lapog bay.

The head of the bay consists of a sandy beach, through which Lapog river discharges.

Off-lying dangers.—South-west shoal, with a least depth of 13 feet (4m0) over it, lies about 2 miles westward of Darrena point; a shoal, with a least depth of 4 fathoms (7m3) over it, lies about 1½ miles westward of Darrena point.

Masbate shoal, with a least depth of 25 feet (7m6) over it, lies about 1¼ miles west-south-westward of Darrena point.

Salomague harbour. — Light. — Dangers. — Buoys. — Salomague harbour lies close northward of Lapog bay; it is entered between Darrena point and Salomague point, about one mile northward. This harbour is of little commercial importance but affords protection from all but westerly and south-westerly winds. During the South-west monsoon, coasting steamers sometimes unload here when it is too rough to do so at Pandan (page 251), or off Laoag river (page 256).

Salomague point is a bluff table land, 103 feet (31m4) high, from which a reef, which dries, extends about 3 cables south-westward.

Salomague island, 110 feet (33m5) high, and covered with brushwood and grass, lies on the northern side of the approach to the harbour, 4½ cables offshore, and forms a good landmark to vessels approaching from southward or northward; it is fringed by a narrow coral reef.

The channel between Salomague island and the mainland has a least depth of 33 feet (10m1) in the fairway, and is sometimes used by small steamers with local knowledge.

The shores of Salomague harbour are fringed with reefs which extend from about half a cable to one cable from the southern shore, and as much as 1¾ cables from the northern shore. There are two small coves formed by breaks in this reef; one on the northern side of the harbour about half a mile eastward of Salomague point (*Lat. 17° 47′ N., Long. 120° 24′ E.*), the other near the head of the harbour. Each of these coves has a sandy beach at its head, and in the northern cove there is a pier, with a depth of about 16 feet (4m9) at its outer end. Water is laid on to the pier.

The small town of Salomague stands at the head of the northern cove; an old whitewashed tower is situated close westward of the town. There is regular steamer communication with coastal ports.

A light is exhibited, at an elevation of 39 feet (11m9), from a white framework tower close southward of the village of Dardarat, which is situated near the cove at the head of the harbour.

North shoal, which dries about 2 feet (0m6), and on which the sea usually breaks, is steep-to; it lies off the northern side of the entrance to the harbour, about 3 cables south-south-eastward of Salomague point. A black can buoy, No. 1, marks the south-western end of this shoal.

Middle shoal, with a least depth of 3 feet (0m9) near its centre, lies near the middle of the harbour about 5½ cables north-eastward of Darrena point. A red conical buoy, No. 2, marks the north-western extremity of this shoal.

A detached shoal, on which there are some rocks, with depths of less than 6 feet (1m8) over them, lies in the entrance to the cove at the head of the bay.

Anchorage.—Directions.—There is good anchorage, in a depth of 8 fathoms (14m6), about 6½ cables westward of the light-structure, with

Digitized by Google

Chart 3545, plan of Salomague harbour and Lapog bay.

the old tower bearing 349°. Small vessels can find better shelter, in a depth of 7 fathoms (12m8), eastward of North shoal.

Charts 3545, plan of Salomague harbour and Lapog bay, 3805.

A vessel approaching Salomague harbour from southward should keep Pinget island bearing less than 180° until the harbour light-structure bears 090°, when she should steer for it on that bearing to the anchorage.

Chart 3545, plan of Salomague harbour and Lapog bay.

A vessel with local knowledge can enter, passing between South-west and Masbate shoals, by steering for Salomague point, bearing 038°, until the light-structure bears 090°, when she should follow the directions given above.

A vessel approaching from northward should pass not less than half a mile westward of Salomague island, and keep on a southerly course until the light-structure bears 090°, when she should follow the directions given above.

Chart 3805.

Coast.—Dangers.—Between the point eastward of Salomague island and Solot point, about 7¼ miles northward, the coast forms a bight, in which are several small sandy coves separated by points from which reefs extend as much as 3½ cables offshore.

Cabugao (Kabugao) bay, the south-eastern part of the bight, is entered between the point eastward of Salomague island and a point about 4¾ miles north-north-eastward; it affords good shelter in southerly winds.

A spit, with depths of less than 5 fathoms (9m1) over it, extends about 7 cables north-north-westward from the southern entrance point of Cabugao bay.

Cabugao (Kabugao) point (*Lat. 17° 49′ N., Long. 120° 26′ E.*), about 2 miles north-eastward of the southern entrance point, rises at about half a mile inland to an elevation of 175 feet (53m3); a shoal, with a depth of 27 feet (8m2) over it, lies about 4½ cables north-north-westward, and Cabugao shoal, with a depth of 3 fathoms (5m5) over it, lies about 1¼ miles north-westward of this point.

A spit, with a least depth of 22 feet (6m7) near its outer end, extends about one mile north-westward from the northern entrance point of the bay.

Badoc (Badok) island lies about three-quarters of a mile westward of Solot point, from which it is separated by a channel, with depths of 20 fathoms (36m6) in the fairway. The island is 130 feet (39m6) high, and bold on its western side; it is covered with grass and a few trees, one of which, near the middle, is solitary and prominent. A reef fringes the northern and western sides of this island.

Between Salomague and Badoc islands there are two banks, with depths of 7 fathoms (12m8) over them, lying 3¾ and 2 miles, respectively, south-south-westward of Badoc island.

Anchorages.—Vessels with local knowledge can anchor, in depths of about 7 fathoms (12m8), in the south-western part of the bay, westward of Cabugao point; or, in depths of from 6 to 7 fathoms (11m0 to 12m8), in the cove close north-eastward of Cabugao point, taking care to avoid a patch, with a least depth of 1½ fathoms (2m7) over it, near its head.

During westerly or moderate northerly winds, vessels with local

Digitized by Google

Chart 3805.

knowledge can anchor, in depths of 20 fathoms (36m6), between Badoc island and the mainland. In strong northerly winds there is fairly sheltered anchorage for small vessels with local knowledge, in a depth of 11 fathoms (20m1), off the mouth of a cove formed in the fringing reef about 1¼ miles south-south-eastward of Solot point; there is good landing for boats on the sandy beach at the head of this cove.

Coast.—Dangers.—Lugot point, from which a reef extends about one cable, lies about 1¼ miles north-eastward of Solot point. Between Lugot point and Gabot point, about 2½ miles north-eastward, the coast consists of a sandy beach close inland of which there are shifting sand dunes.

Chart 3545, plan of Port Currimao and Gan bay.

A reef, which dries, extends about a quarter of a mile north-westward from Gabot point, and on the reef close off the point is Gabot islet; a rock, 10 feet (3m0) high, lies near the northern extremity of the reef, and a bank, with depths of less than 3 fathoms (5m5) over it, on which are some large coral boulders, extends nearly a quarter of a mile northward from the rock.

There is good landing on either side of Gabot islet, according to the prevailing wind.

Gan bay.—Dangers.—Between Gabot point and Arboledan point, about 3 miles north-north-eastward, the coast forms a bight, at the head of which is Gan bay. From the coast near the southern end of the bight, about three-quarters of a mile north-eastward of Gabot point, a reef, which dries, extends about 3½ cables offshore. North-eastward of this reef the coast consists of sandy beaches with rocky ledges between them.

The village of Muglavis stands on the shore about one mile north-eastward of Gabot point; boats can land on the beach near the village.

A coral shoal, with a least depth of 5 feet (1m5) over it, lies on the southern side of the entrance to Gan bay, with its southern end about 5½ cables north-north-westward of Muglavis village. It is separated from the coastal reef southward by a narrow and tortuous channel.

The northern entrance point of Gan bay, situated about 5½ cables south-eastward of Arboledan point (*Lat. 18° 01′ N., Long. 120° 29′ E.*), is low, and fringed by a reef, which dries for about one cable offshore. A spit, with depths of 19 feet (5m8) near its outer end, extends about three-quarters of a mile south-westward from this point.

Vessels with local knowledge can anchor, in depths of from 6 to 10 fathoms (11m0 to 18m3), sand and mud, north-eastward of the shoal on the southern side of the entrance.

There is a concrete pier, with a depth of 21 feet (6m4) at its head, about 4 cables north-eastward of Muglavis village.

Port Currimao. — Light. — Dangers. — Port Currimao is a cove entered between Arboledan point and the northern entrance point of Gan bay; it affords indifferent and restricted shelter to vessels with local knowledge during the North-east monsoon, but is the nearest available anchorage to Laoag (page 256) when, owing to weather, vessels are unable to lie off the mouth of Laoag river.

A light is exhibited, at an elevation of 27 feet (8m2), from a white tower situated in the old southern fort, on the south-eastern entrance point of the port.

Charts 2661b, 1263.

Digitized by Google

Chart 3545, plan of Port Currimao and Gan bay.

Arboledan point is from 12 to 15 feet (3m7 to 4m6) high. At about 2 cables inland the southern end of a ridge, covered with bushes and a few trees, rises to an elevation of 135 feet (41m1), and is prominent.

With the exception of a narrow beach at the mouth of Currimao river, about 3 cables eastward of Arboledan point, the entire shores of the port are fringed by reefs. A large stone church, now used as a warehouse, is situated about 2¼ cables east-north-eastward of Arboledan point, and is prominent from southward. Boats can land at the inner end of the cove in the reef near the old church, but, owing to rocks, caution should be exercised, especially near low water. The northern fort, or tower, painted white, lies about midway between Arboledan point and the old church ; the southern fort, or tower, is of dark stone. The village of Currimao stands close eastward of the old church, on both sides of Currimao river, but little of it is visible from seaward.

Anchorage. — Directions. — The anchorage is, in a depth of 11 fathoms (20m1), soft mud, about 4¼ cables 285° from the light-structure. Small vessels can anchor, in a depth of 9 fathoms (16m5), north-eastward of this position.

Vessels entering the port should steer for the light-structure, bearing 105°, which leads to the anchorage described above.

Chart 3805.

Coast.—Between Arboledan point and Culili (Kulili) point, 4¼ miles northward, the coast is fringed by a bank, with depths of less than 3 fathoms (5m5) over it, which extends in places about 3 cables offshore. Culili point is a prominent rocky bluff, bare of trees, which rises from the sand dunes eastward to an elevation of 114 feet (34m7). Between Culili point and the mouth of Laoag river, 6½ miles north-north-eastward, the coast is low and sandy, with sand dunes close inland, and from it a bank, with depths of less than 3 fathoms (5m5) over it, extends from 1½ cables offshore at the southern end, to about 4 cables at the northern end.

The mouth of Laoag river is closed by a bar, over which boats can pass to the landing place about half a mile higher up. The important town of Laoag, which is connected to the general telegraph system, is situated about 4½ miles up the river.

Mount Cauit, a grassy sandhill, 303 feet (92m3) high, with some trees on its summit, lies near the coast on the northern side of the mouth of Laoag river. The summit of the hill appears as a nipple, and is a prominent landmark on this otherwise low coast.

Outlying bank.—A bank, with a depth of 24 fathoms (43m9) over it, was reported, in 1950, to lie about 12 miles west-north-westward of the mouth of Laoag river.

Anchorage.—There is anchorage for vessels with local knowledge, in a depth of 9 fathoms (16m5), sand, south-westward of the mouth of Laoag river, with Mount Cauit bearing 045°, and Culili point 202°, but there is no shelter. In bad weather vessels can often find anchorage at Port Currimao when conditions are unfavourable for anchoring here.

Coast.—Between the mouth of Laoag river and Cape Bojeador (*Lat. 18° 30′ N., Long. 120° 34′ E.*), about 18 miles northward, the coast is low and sandy to within 3 miles of Dirique inlet, which lies about 2 miles southward of the cape. During the North-east monsoon

Charts 2661b, 1263.

Digitized by Google

Chart 3805.

temporary anchorage can be found close off this part of the coast by vessels with local knowledge.

The mountain range which extends from near Lingayen gulf along the western side of Luzon is here about 25 miles from the coast, with low land and a few prominent scattered hills between. The range is rugged with several sharp peaks, but, except during the dry season, they are usually obscured by clouds.

Dirique inlet affords good anchorage, in a depth of 10 fathoms (18m3), for small craft with local knowledge, during the North-east monsoon, sheltered from all but south-westerly winds.

Coral reefs, which dry, and a bank with depths of less than 5 fathoms (9m1) over it, extends about 2½ cables westward from the southern side of the entrance, and about 2¼ cables southward from the northern entrance point of this inlet, narrowing the entrance channel between the 5-fathom (9m1) lines to about three-quarters of a cable. A small fresh water stream flows out at the head of the inlet.

Between Dirique inlet and Cape Bojeador the coastal reef dries for about three-quarters of a cable offshore, and a bank, with depths of less than 3 fathoms (5m5) over it, extends in places about a quarter of a mile seaward of the reef.

Nagabungan bay.—Dangers.—Nagabungan bay is a narrow inlet, situated about half a mile southward of the western extremity of Cape Bojeador. Coral reefs, which dry, extend about 1¼ cables from the southern, and half a cable from the northern entrance points, and the entrance is further obstructed by banks with depths of less than 3 fathoms (5m5) over them, extending from either shore, leaving a navigable channel less than half a cable wide. The bay is only available to very small vessels with local knowledge.

On the north-eastern side of the bay, there is a small wharf, with depths alongside of 7 feet (2m1).

There is telephonic communication with Laoag.

Cape Bojeador.—Light.—Cape Bojeador, which extends from Nagabungan bay to a point about 2 miles north-eastward, is the north-western extremity of Luzon ; it is low near the coast and rises gradually to a broken ridge, 740 feet (225m5) high, which is bare of trees, and lies about 2½ miles eastward.

A light (*Lat. 18° 30′ N., Long. 120° 34′ E.*) is exhibited, at an elevation of 386 feet (117m6), from a white octagonal tower on the summit of a prominent hill about 2½ miles east-north-eastward of the western extremity of Cape Bojeador. *See* views facing pages 43 and 231.

The cape is fringed by reefs, on which the sea breaks, which extend as much as 3½ cables offshore, and foul ground, with depths of 3½ fathoms (6m4) and less, extends more than half a mile north-westward from the outer edge of this reef.

A rock, with a depth of less than 6 feet (1m8) over it, lies about half a mile westward of the southern extremity of Cape Bojeador.

The northern extremity of the cape consists of a point, composed of overhanging, black, coral cliffs, with grass-covered top, about 50 feet (15m2) high ; close southward of this point there is an indentation in the coral reef where landing can be effected except during north-westerly winds.

For the description of the north coast of Luzon eastward of Cape Bojeador, *see* Eastern Archipelago Pilot, Vol. I.

Charts 2661b, 1263.

Digitized by Google

Chart 2661b.

REEFS IN THE NORTHERN PART OF THE CHINA SEA.—The following reefs lie in the area covered by this volume, near the track of vessels proceeding from Hong Kong to Manila and the northern part of Luzon. For reefs westward of these, *see* China Sea Pilot, Vol. I.

Scarborough reef.—Scarborough reef, on which the *Scarborough* struck, in 1748, lies about 120 miles westward of the west coast of Luzon, with its eastern end in lat. 15° 07′ N., long. 117° 51′ E. The reef is steep-to on all sides, and consists of a narrow belt of coral, nearly awash, enclosing a lagoon of clear blue water. On the reef there are several rocks, from 3 to 10 feet (0m9 to 3m0) high; South rock, the highest of these, is situated at the south-eastern extremity of the reef.

Close northward of South rock there is a channel, about 2 cables wide, with depths of from 5 to 6 fathoms (9m1 to 11m0), leading into the lagoon, but it is obstructed by patches of reef, with depths of about 1½ fathoms (2m7) over them; just within the entrance the lagoon is shallow.

In fine weather it is just possible to find precarious anchorage off the entrance to the lagoon.

In the vicinity of Scarborough reef the current varies with the monsoon. The predominant direction is north-westerly or westerly during the North-east monsoon, and north-easterly during the South-west monsoon.

Truro shoal.—Truro shoal, situated in lat. 16° 19′ N., long. 116° 41′ E., was discovered by Captain T. J. Duggan, of the ship *Truro*, in September, 1857. He states: "Whilst taking my forenoon observations, distinctly saw the bottom, white coral. Got a cast of the lead instantly in 10 fathoms; again about half a mile further north, had 19 fathoms; steered north for another half mile and had 22 fathoms and the next cast no bottom at 40 fathoms; no shoal patches were visible from the masthead."

Another 10-fathom (18m3) patch is charted 3½ miles east-northeastward of that described.

Chart 362.

Pratas island and reef.—Pratas island (*Lat. 20° 42′ N., Long. 116° 43′ E.*), about 245 miles north-westward of Cape Bojeador, lies on the western side of a circular coral reef enclosing a lagoon. The island is covered with scrubby bush, and is about 40 feet (12m2) high to the top of the vegetation; in the hazy weather which prevails in this locality during the North-east monsoon, the island is seldom visible beyond a distance of 5 or 6 miles, and the breakers at the edge of the reef may possibly not be seen until within a distance of one mile. (*See* also Fog and visibility on page 33.) The island is composed of sand, and has a shallow inlet on its western side, which affords shelter to the Chinese fishermen who come here in the early part of the year. There is a settlement on the north-eastern side of the island.

There are two jetties on the north-eastern side of the island, the principal one being about 60 feet (18m3) long, with a depth of 6 feet (1m8) at its head. The other jetty is only available for very light draught boats, and there are several rocks in its vicinity. There is a wooden pier suitable only for light craft on the southern side of the island, southward of the old light-tower. Sea birds are numerous in the breeding season.

Charts 2661b, 1263.

Digitized by Google

Chart 362.

There is a radar reflector, two radio masts and an observation tower on the island. There is a prominent clump of three trees situated on the southern side of the island about a quarter of a mile west-south-westward of the radio masts.

Pratas reef is from one to 2 miles wide ; the southern, eastern, and northern sides, as well as a portion around Pratas island, just dry at low water and are steep-to along the greater part of their outer edges. Two channels give access to the lagoon, one on either side of Pratas island ; there are many coral knolls in the lagoon, some of which dry.

South channel, about 4½ miles southward of Pratas island, is about 2½ cables wide at its entrance, with a least depth of 19 feet (5^{m}8), which depth can be carried for about 1½ miles towards the settlement, whence the depths decrease to less than 3 fathoms (5^{m}5), with numerous coral heads, with depths of less than 6 feet (1^{m}8) over them. A white sand spit, which breaks with a westerly swell, lies on the northern side of this channel and about 2 miles southward of the western extremity of Pratas island. North channel, about 2½ miles northward of Pratas island, has a depth of 19 feet (5^{m}8) in its entrance, but the depths decrease to less than 12 feet (3^{m}7) about one mile within in the direction of the settlement, whence there are numerous coral heads with depths of less than 6 feet (1^{m}8) over them.

A 5-fathom (9^{m}1) coral patch lies about 3¾ miles west-south-westward of the radio masts.

A wreck was reported, in 1934, to be situated on the outer edge of the reef close to South-east bend, about 9½ miles south-eastward of Pratas island, and a conspicuous wreck of the fore part of a vessel, about 40 feet (12^{m}2) high, was reported, in 1926, to lie on the outer edge of the reef near North-east point, about 10 miles east-north-eastward of the island (*Lat. 20° 42′ N., Long. 116° 43′ E.*).

Anchorages.—Directions.—Although Pratas reef is steep-to in most parts there are several spots where, in case of necessity, a vessel might find anchorage outside the breakers, particularly on the western side, abreast the middle of North and South channels. A vessel of light draught exercising great caution may obtain a safe anchorage inside South channel, in depths of from 17 to 24 feet (5^{m}2 to 7^{m}3).

Anchorage may also be obtained, in a depth of 16 fathoms (29^{m}3), with the southern radio mast bearing 066°, distant about 2½ miles.

During the strength of the monsoons vessels should always endeavour to pass to leeward of Pratas reef, on account of the invariable set of the current to leeward ; soundings give no warning of a vessel's approach to it, and the weather is frequently thick and hazy in this vicinity. (*See* also Fog and visibility on page 33.) The safest quarter to make the reef from is the western, as the island is on this side and the currents set in a north-east or south-west direction, according to the prevailing monsoon ; approaching the reef a vessel should be conned from aloft, as with the sun in a favourable position the bottom can be seen in a depth of 10 fathoms (18^{m}3). Vessels should not approach the island with the southern radio mast bearing between 065° and 080°.

There is a sandy spit extending south-eastward from the south-eastern extremity of the island. During the South-west monsoon this is the best place to land.

Pratas reef, lying in the route between Manila and Hong Kong, is a serious danger to vessels using that route, especially in the North-

Digitized by Google

Chart 362.

east monsoon, when gales are common and thick clouds are sometimes prevalent for weeks together.

Discoloured water.—The area eastward of Pratas reef abounds with discoloured water; some of the areas reported are indicated on the chart.

Currents.—Tide-rips.—At distances of from 20 to 50 miles north-westward, through north, to north-eastward, of Pratas reef, during the times of various searches being made for reported shoals, the currents in the neighbourhood were found to be exceptionally strong, and tide-rips were frequently observed, which occasionally appeared like breakers. On one occasion, in 1889, Captain the Hon. F. C. P. Vereker reported that, on the night of 22nd March: "Breakers were distinctly heard, with regular intervals between the breaks, and altering course I steered towards them, sounding carefully. There was a fair amount of moonlight, and I was nearly convinced we had discovered the shoal until I obtained a sounding of 202 fathoms, muddy bottom, in the centre of the breakers, and found it was a small, but heavy, tide-rip travelling to the north-westward."

Chart 1263.

In 1937, tide-rips were reported about 23 miles northward of Pratas island (*Lat. 20° 42′ N., Long. 116° 43′ E.*).

Charts 976, 3806, 943, 2661b, 1263.

Digitized by Google

APPENDIX I

LIST OF PORTS AVAILABLE FOR UNDER-WATER REPAIRS, with details of Largest Dry or Floating Dock or Patent Slip at each Port.

NAME OF PORT AND DOCK	Length from bilge of Caisson or Mitre Post of gates at		Breadth of Entrance at		‡ Distance {below (+) above (−)} Chart datum level of			Springs rise	FLOATING DOCKS, PATENT SLIPS, &c.			REMARKS
						Blocks, at			Maximum depth over blocks		Lifting power	
	Coping head	Floor head	Coping	MHWS level	Sill	Entrance	Head		Forward	Aft		
	(1)*	(2)*	(3)†	(4)†	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	Feet	Feet	Feet	Feet	Feet	Feet	Feet	Feet	Feet	Feet	Tons	
PONTIANAK :												
Dry dock . . .	208	—	29·5	27	—	—	—	—	—	—	—	
KUCHING :												
Dry dock . . .	249·5	241·5	45	44·2	−2·45	−2·45	−2·45	14·7	—	—	—	
NAVOTAS :												
Patent slip . .	450	166	—	—	—	—	—	—	6	10	500	
CAVITE :												
Patent slip . .	422	130	—	—	—	—	—	3·2	—	—	400	
CANACAO :												
Patent slip . .	820	360	—	—	—	—	—	3·2	4·75	19·75	3,000	
MANILA :												
Patent slip . .	1,200	420	—	—	—	—	—	3·2	5	17	2,000	
OLONGAPO :												
Floating dock . .	500	—	99·8	—	—	—	—	3·0	30	30	18,000	Lift probably reduced.

* In the case of Floating Docks, Patent Slips, &c., Column (1) = Extreme Length. Column (2) = Length on Blocks or Cradle.
† In the case of Floating Docks, Column (3) = Breadth at Top. Column (4) = Breadth at bottom of Dock.
‡ In order to find the depths on Sill, &c., the quantities in columns (5), (6) and (7) should be applied according to sign to the predicted or calculated height of tide as obtained from the Admiralty Tide Tables.

Digitized by Google

APPENDIX II

LIST OF PRINCIPAL PORTS, SHOWING PARTICULARS OF DEPTHS, &c.

PORT	Depth below Chart datum level		Rise of Tide		REMARKS
	In channel of approach	In anchorage	Spgs.	Nps.	
			Feet	Feet	
Pontianak	4 feet	9 fathoms	3·9	—	
Sambas	6 feet	—	3·0	2·6	13 feet alongside quay
Kuching	*16 feet	†4½ fms.	14·7	14·4	*Muara Tebas entrance †Off Pending
Sadong	*5 feet	—	—	—	*On bar at mouth of river
Sibu	—	*14 feet	13·0	9·0	Vessels with draught of 12 feet can reach Sibu. *Alongside two wharves
Miri	Deep	5 fathoms	—	—	Open roadstead
Labuan:					
Victoria harbour	5½–12 fms.	5½–12 fms.	6·9	5·2	
Brunei	7 feet	7 fathoms	6·5	4·9	Off Sultan's palace
Limbang	6 feet	—	—	—	17 feet alongside wharf
Jesselton	8 fathoms	8 fathoms	5·1	3·4	
Kudat	7 fathoms	4–7 fms.	7·1	5·2	14 feet alongside jetty
Malampaya sound:					
Outer part	Deep	6–14 fms.	4·0	—	
Inner part	Deep	5 fathoms	—	—	
Mariveles harbour	Deep	13–17 fms.	—	—	26 feet alongside wharf
Cavite	4½ fathoms	4 fathoms	—	—	
Manila	29 feet	—	3·2	1·4	35 feet alongside No. 15 pier
Port Olongapo	Deep	12–13 fms.	3·0	1·3	
Port Sual	7–10 fms.	5–11 fms.	2·5	1·2	
San Fernando harbour	Deep	8–9 fms.	2·4	1·2	

Digitized by Google

APPENDIX III

LIST OF SPOTS SUITABLE FOR MAGNETIC OBSERVATIONS.

Place	Lat.	Long.	Position
Pulau Mangalum .	6° 11′·7 N.	115° 36′·2 E.	On beach at high water line on the south-south-eastern side.
Manila . . .	14° 35′·4 N.	120° 58′·2 E.	
Antipolo . .	14° 36′ N.	121° 10′ E.	

Digitized by Google

Digitized by Google

INDEX

	Page
Abai :	
Bluff	142
Kuala	142
Sungei	142
Village	142
Abana rock	111
Abra river	250
Acasta rock	46
Acis shoals	100
Ada reef	151
Adela rock	243
Afuera shoal	213
Agal bay	145
Agal, Tanjong	144
Agno :	
Bay	239
River	244
Town	239
Agong Agong river	147
Agong Agong, Tanjong	147
Aguada point	160
Aguawan point	218
Agusan river	4
Agusuhin point	228
Light	228
Agutayan island	196
Air lights	21
Airy, Mount	166
Ajam, Tanjong	48
Ajer Buluh village	60
Ajer Litjin, Teloh	69
Alasasin point	218
Alava island	203
Albaguen island	174
Albay island	152
Albay shoal	167
Albion head	162
Alcade point	186
Alert rock	143
Alerta rock	200
Alicia Annie reef	199
Alida shoal	49
Alison reef	197
Alligator :	
Bay	184
anchorage	184
dangers	184
Island ; Halsey harbour	203
Island ; Malampaya sound	184
Rock	178
Alupihing point	234
Amalingat point	172
Ambawang gebergte	71

	Page
Ambawang, Sungei	71
Ambil island	213
Ambil shoal	214
Amboina cay	197
Ambok, Bukit	106
Ambong :	
Bay	139
anchorage	140
dangers	139
directions	140
Tanjong	138
Village	139
Amboyna cay	197
Ambulong island	209
Amburayan river	247
Amcotts rock	109
Ampa patches	107
Amy Douglas bank	199
Anak Awur	43
Anambas eilanden	42
Anato island	181
Anchorage islet	178
Anchu, Tanjong	48
Andeyro point	150
Anepahan :	
Peaks	166
Range	166
Settlement	167
Anson passage	120
Ant islets	143
Ant rocks	143
Antelope shoal	156
Antelope shoal, North-east	157
Antju, Tanjong	48
Antu islet	58
Antucao point	214
Antukao point	214
Apalit point	229
Api passage	85
Tidal streams	85
Api, Tanjong	84
Apo :	
East pass	208
bank	208
dangers	208
directions	209
Island	207
light	207
Mount	4
Reef	209
West pass	207
islands and dangers	207

Digitized by Google

	Page
Apoi, Bukit	125
Apurauan point	165
Apurauan village	165
Arboledan point	255
Ardasier bank	101
Ardasier reef	101
Arenas point	236
Ariringan point	160
Aro point	212
Arsat rocks	143
Aru, Tanjong	131
Asu Ansang, Mount	84
Awar, Telok	90
Ayer, Gunong	90
Ayer Lichin, Telok	69
Ayer Sekian village	52
Babi islet	72
Bacao Bacao point	158
Bacbac island	206
Back Cap	163
Bacoor bay	220
Bacuit bay	192
Anchorage	194
Dangers	192
Directions	194
Islands and dangers	193
Islands and dangers in approach	188
Tidal streams	194
Bacuit town	195
Badas eilanden	42
Islands and dangers northward of	45
Islands and dangers south and east of	44
Badjau, Tanjong	79
Badoc island	254
Badok island	254
Badu Kang, Pulau	121
Bagac bay	226
Bagac town	226
Bagak bay	226
Bagak town	226
Baharu islet	72
Baheli peak	166
Baheli river	170
Bahia Honda point	164
Baja, Punta	158
Bajallanura island	163
Bajau, Tanjong	79
Bajung, Tanjong	83
Bakau :	
Islet ; Natuna eilanden	55
Islet ; Paloh, Sungei	83
Tanjong	91
Baker reef	199
Bakuit bay, *see* Bacuit bay	
Balabac Great reefs	151
Balabac island	150
Aspect	150
Climate and weather	22
Directions	151
Pilotage	7
Tidal streams	151
Western side	150
dangers	150
light	150
Balabac peak	150
Balabac strait, North	152
Islands and dangers	152
Balai Sepuwah	76
Balait, Batang	106
Balansungain peak	157
Balauan point	185
Balimanoc point	239
Balincaguin river	239
Balingasay bay	239
Balingasay point	239
Balingian, Batang	97
Balinkaguin river	239
Balintang point	158
Balolo rock	185
Baluarte	238
Baluku, Tanjong	94
Balulu point	184
Bancal river	232
Bancalan island	152
Bancalon point	186
Bandang, Tanjong	87
Bando point	182
Bangar point	242
Bangar town	247
Bangawan, Sungei	129
Bangawan village	129
Bangayao point	242
Bangkai, Tanjong	77
Bangkam hill	78
Bani point	233
Banisi point	160
Banjo	52
Bankalon point	186
Bantac island	208
Bantak island	208
Bantan, Selat	72
Bantanan, Sungei	81
Baram, Batang	104
Baram, Tanjong	102
Light	104
Barat banks	111
Barotoan bay	196
Barque Canada reef	197
Barrier, The ; Brunei, Sungei	122
Barselisa island	201
Bartoc islet	185
Bartok islet	185
Barton, Port	174
Anchorage	175
Approach	173
islands and dangers	173
Islands and dangers	174
Barton shoal	146
Baru island	78
Baru-Baru, Pulau	122
Base bay	196
Base rock	201
Bataan, Mount	226
Batang = River, *see* proper name	
Batang island	58
Batang Lupar gebergte	76
Batang Marow, Tanjong	95
Bate channel	152
Batong	46
Batu = Rock, *see* proper name	
Batu islet	43
Batu, Tanjong ; Borneo, NW. coast	100

Digitized by Google

	Page
Batu, Tanjong; Muara Tebas entrance	87
Batu, Tanjong; Saráwak, Sungei	91
Batu Baja, Mount	77
Batu Batu	118
Batu Belat peak	78
Batu Belat, Tanjong	42, 78
Batu Lepu village	49
Batu Pandan, Tanjong	61
Batu Pintu spit	121
Batu Priuk village	56
Batumandi rock	145
Bauang point	243
Bauang river	244
Bawang, Mount	77
Bay:	
Hill	141
Island; Jibboom bay	172
Islands; Imuruan bay	177
Islet; Malampaya sound	186
Peak	176
Rock; Golgotha head	184
Rock; Ross, Cape	178
Bayung, Tanjong	83
Beacon rocks	202
Beaufort, Mount	166
Beaufort town	3
Bediri, Bunong	94
Bedong, Mount	67
Bedua	47
Bedung, Mount	67
Beehive:	
Head	187
Point	169
Rocks	144
Belait:	
Batang	106
Kuala	106
Village	106
Belajar, Tokong	49
Belatjan islet	81
Belawai, Kuala	97
Belcher rocks	91
Belcher shoal	140
Belitang, Sungei	76
Belitang village	76
Belitung, Tanjong	60
Bemban, Sungei	84
Bendang, Batu	80
Bengah island	75
Benoni, Sungei	129
Bentoan peak	168
Bentoan point	169
Benua	47
Berambang, Pulau	125
Bertumpa, Tanjong	48
Besar, Mount	80
Betanak, Kampong	97
Betbet islet	176
Betbet point	176
Bethune head	109
Beting = Shoal, *see* proper name	
Betong village	95
Betunde	48
Bicol river	4
Big Bonanza shoal	146
Bigun bay	192
Bila, Tanjong	80
Bilin, Tanjong	53
Bilis, Batu	62
Binabalian point	240
Binalabag island	202
Binaluan village	182
Binanga point	227
Binanga, Port	227
Anchorage	227
Dangers	227
Directions	227
Binangculan bay	190
Binangculan point	190
Binarera point	211
Binatang	96
Binayan point	190
Bindjei, Kuala	61
Approaches	60
beacons	60
islands and dangers	60
light	61
Beacons	61
Buoy	61
Islands and dangers	61
Bindjei, Sungei	62
Bindjei village	62
Binga point	177
Bini	48
Binicayat hill	158
Biniptican point	230
Binjei, *see* Bindjei	
Bintawak channel	93
Bintulu, Kuala	98
Bintulu town	98
Bisa, Pulau	144
Black head	178
Black rock	169
Black Rock point	187
Blimbing, Tanjong	83
Blinsah, Tanjong	86
Blitung, Tanjong	61
Bloomfield, Mount	168
Bluff point; Barton, Port	173
Bluff point; Cuckold hill	164
Bluff point; Herschell, Mount	167
Blunt rock	109
Boat rock	182
Boayan island	173
Boayan reef	174
Boenga, Tanjong	72
Bog point	163
Bojeador, Cape	257
Light	257
Bolalo bay	181
Bolalo hill	177
Bold head; Boayan island	173
Bold head; Taluran island	180
Bolinao:	
Cape	239
light	239
Harbour	240
anchorage	240
dangers	240
directions	240
light	240
Town	240
Bombay shoal	198
Tidal streams	200

Digitized by Google

	Page
Bonbon point	155
Borneo :	
General remarks	1
West coast	71
aspect	71
climate and weather	22
Borneo, State of North :	
Communications	3
Currency	4
General remarks	3
Government	3
Harbours	3
Products	3
Trade	3
Weights and measures	4
Bornugus, Tanjong	147
Boro, Tokong	63
Boswell islet	184
Botolan, Mount	231
Botolan point	231
Bowong point	119
Boxall reef	199
Brace eilanden	44
Breaker reef	156
Brechtel shoal	159
Brock patch	107
Broken head	168
Brooke dock	93
Brooketon village	120
Brother islets	186
Broughton point	174
Brow Cone	164
Brow shoulder	164
Brown bank	200
Browne patch	107
Bruit, Kuala	97
Bruit village	98
Brunei bay	116
Approaches	109
Beacons	116
Current	112
Dangers	116
Directions	112
East channel	112
beacons	112
buoys	112
island and dangers	112
Signal station	113
Western approach	109
dangers in fairway	111
directions	112
islands and dangers	109
Brunei bluff	107
Brunei channel	122
Brunei cliffs	107
Brunei patches	109
Brunei, State of	2
Communication	2
Currency	2
Products	2
Trade	2
Brunei, Sungei	120
Anchorages	123
Approaches	118
anchorage	119
Beacons	120
Dangers	120
Light	120
Brunei, Sungei—*contd.*	
Pilots	123
Tidal streams	124
Brunei town	124
Buan, Bukit	98
Buang Peiai, Bukit	125
Buang Sakar, Bukit	108
Buaya, Tanjong	91
Bubon point	174
Bucao river	232
Bucid islet	158
Bugsuk island	153
Buiong point	227
Bukao river	232
Bukit = Hill, *see* proper name	
Bulagao, Mount	250
Bulaloc bay	158
Bulalok bay	158
Bulanhau range	154
Bulanjao range	154
Bulawan point	201
Bulijong, Tanjong	132
Buliluyan, Cape	154
Bullock head	183
Bullock point	177
Bullocks rock	178
Buloh, Tanjong	88
Bulu	58
Buluang village	206
Bulybarco point	191
Bulybarko point	191
Bum Bun river	148
Bumin islet	72
Bunan settlement	76
Bunbury shoals	139
Bunga :	
Hill	78
Islet	63
Tanjong	72
Bungin islet ; Sambas rivière, Kleine	81
Bungin islet ; Tambelan eiland	48
Bunta, Karang	64
Bunut, Sungei	77
Bunut village	77
Burbunot, Pulau	124
Buri islets	196
Burong :	
Pulau ; Labuan	110
Pulau ; Lupar, Batang	94
Pulau ; Tega, Pulau	128
Burung :	
Eilanden	78
Rock	58
Tanjong	71
Tokong	69
Bury islets	196
Bush island	175
Busuanga island	205
Islands and dangers northward of	207
West coast	205
off-lying dangers	206
Busuanga river	205
Busuanga town	205
Buton islet	63
Buton, Tokong	43
Button islet	110

Digitized by Google

	Page
Cabalitian bay	242
Anchorage	242
Dangers	242
Directions	242
Cabalitian island	241
Caballo island	218
Light	218
Cabangan point	229
Cabarruyan island	241
Cabayoc point	226
Cabra island, light	214
Cabugao:	
Bay	254
Point	254
Shoal	254
Cabuli point	195
Cabuli island	196
Cabusilan range	231
Cacayatan island	201
Cacbolo island	173
Cacnipa island	173
Cadlao island	191
Cagayan river	4, 215
Caiholo river	170
Caiman:	
Cove	239
Point	237
Shoal	229
light	229
Cake rock	126
Calabuctung islets	183
Calabuctung point	182
Calaguaguin bay	231
Calamian group	202
Calandorang bay	150
Calanhayaun island	208
Calaragnan point	191
Calatagan point	215
Calavite, Cape	212
Light	212
Calavite, Mount	212
Calibang island	201
Calibugon, Mount	158
Calitang point	195
Calonhogon islet	184
Calpay shoal	242
Calumbuyan island	204
Calungpang point	217
Calver point	175
Camago island	181
Camago mabajul point	193
Camago maita point	193
Camanga island	208
Camayan point	227
Camp hill	141
Campanario island	217
Camtas point	211
Camungyan island	168
Canacao bay	220
Canacao town	221
Candaraman inlet	152
Candelaria town	236
Candon point	248
Candon town	248
Cangaluyan island	241
Canica point	185
Canimeran islet	153
Canipan:	
Bay	155
Hill	154
River	155
Canipo island	185
Cansea rock	185
Caoayan village	251
Cap rock	186
Caparayan river	193
Capare island	206
Capoas:	
Cape	178
Low	177
Mount	177
Point	171
Capon Grande island	231
Light	231
Capones islands	231
Capones point	231
Capsalay island	175
Capsalay reef	175
Capyas islet	155
Caquiputan strait	241
Carabao island	217
Caramatan point	175
Carat point	193
Carauisan point	211
Carlatan lagoon	245
Carlatan village	245
Carnatic shoal	199
Carot point	241
Carrasco shoal	229
Caruray settlement	172
Cataaba, Port	187
Cataaba river	188
Catalat island	172
Catalat peak	173
Cauayan island	191
Cauit, Mount	256
Caverna island	191
Cavite harbour	220
Anchorage	220
Approaches	220
Buoyage	220
Lights	220
Prohibited anchorage	220
Cavite town	220
Harbour facilities	221
Typhoon signals	221
Cayos del Bajo	209
Champion shoals	109
Channel rock	186
Chase head	181
Chatuk, Mount	59
Chawat point	172
Chearnley shoal	107
Chermai, Sungei	84
Chevalier, Mount	108
Chinayan head	181
Chinicaran island	185
Chinicaran passage	185
Chinikaran island	185
Chinikaran passage	185
Chinongab peak	177
Chiquita islet	228
Churmin, Pulau	121
Light	122
Churmin rock	122

Digitized by Google

	Page
Ciego, Port	152
Ciminaytay point	193
Cinaran bay	186
Cleopatra Needle	168
Cliff:	
Head	171
Islet	186
Point; Passage island	184
Point; Paz islet	152
Point; Tagbita bay	155
Climatic tables	37–41
Climate and weather	22
Coal supplies	22
Coast hill	188
Cochinos, Los	217
Cochinos point	217
Cochrane, Mount	143
Collier head	113
Collingwood shoal	161
Collins reef	198
Coloby shoal	157
Colocoto rocks	207
Coloma rock	186
Colombo shoal	109
Columbine shoal buoy	113
Comas islet	242
Comber reef	135
Commodore reef	197
Comocutuan islet	193
Concepcion town	205
Conduaga river	159
Conduaga settlement	158
Condut island	201
Cone island; Barton, Port	175
Cone islet; Worcester strait	181
Confusion rock	173
Conical head; Endeavour strait	181
Conical head; Mayday bay	173
Connell reef	101
Consul	22
Cooke island	183
Coral bay	153
Coral point	170
Cordelia point	169
Cornwallis South reef	198
Coron island	202
Corongcorong bay	192
Corregidor cove	218
Light	218
Corregidor island, light	218
Corumi, Mount	158
Corumi range	161
Corumi range, False	161
Cotteral point	177
Cowie hill	108
Crane island	182
Crater shoal	179
Crawford point	195
Creighton patch	134
Crescent reef	178
Cross point	89
Cruizer rock	88
Cubi point	228
Cubud island	196
Cuckold hill	164
Cudugman bay	192
Cudugman point	192
Culasa point	190
Culasian bay	158
Culasian river	158
Culebra islet	237
Culili point	256
Culion island	202
Islands and dangers NW. and north of	204
Western side	203
Culion leper colony	202
Cunningham patch	109
Currents	7
Currimao:	
Port	255
anchorage	256
dangers	255
directions	256
light	255
River	256
Village	256
Custodio point	188
Daät, Pulau	113
Dagupan river	244
Anchorage	245
Light	244
Pilotage	245
Dagupan town	244
Dalaga point	173
Dalahican island	153
Dalawan bay	150
Dallas reef	102
Dalolac point	235
Dalrymple point	168
Damao channel	185
Damao island	185
Damar island	78
Dampirit river	148
Danet bay	193
Dangerous ground	197
South-eastern part	198
Dapai river	184
Dapay river	184
Dapua point	227
Dardarat village	253
Darigayos:	
Inlet	247
Point	247
River	247
Village	247
Darocotan point	195
Darokotan point	195
Darrena point	252
Dasol bay	236
Islands and dangers	236
Lights	236
Datag islet	158
Datu:	
Mount	84
Peninsula	85
Pulau; Borneo, NW. coast	86
Pulau; Borneo, west coast	71
Tanjong; Borneo	84
light	85
Tanjong; Groot Natuna eiland	65, 69

Digitized by Google

	Page
Datum rock	148
De Mieulle reef	68
Dean island	175
Deans head	169
Debogso rock	201
Del Monte point	212
Deluar shoals	128
Dengajak	55
Depeldet islet	192
Derian	63
Destacado rocks	189
Detobet point	205
Devils Cap	163
Devonport reef	66
Diana riffen	57
Diapila bay	196
Diapila island	196
Dibuluan island	194
Dicabaito channel	202
Dicabaito island	202
Dicapululan island	202
Dicoyan island	204
Diculacud point	193
Dido rock	93
Diente :	
Hill	177
Point	178
Shoal	180
Difficult point	188
Dikabaito channel	202
Dikabaito island	202
Dikapululan island	202
Dikoyan island	204
Dikulakud point	193
Dilarog point	192
Dile point	251
Dilumacad island	191
Dilumakad island	191
Dimanglet island	201
Dimipac island	207
Dimipak island	207
Dinawan anchorage	130
Dinawan, Pulau	130
Dirique inlet	256
Disaster, Cape	151
Discovery bank	209
Dita Dita islet	158
Dixon reach	107
Djaksa baai	78
Djali	62
Djangkulak	48
Djangkulan	45
Djantai	65
Djapu	54
Djela	47
Djunkat	73
Dongon bay	210
Dongon point	209
Doris reef	69
Dos Hermanos rocks	240
Double island ; Barton, Port	175
Double island ; Pagdanan bay	176
Double island ; Treacherous bay	163
Double peak	157
Double rock	182
Double Cone islet	184
Dua Blas, Pasir	95
Dua rots	53
Ducoy village	240
Duhme shoal	167
Dukan, Tanjong	129
Dumdum	45
Dumpil :	
Rock	131
Sungei	130
Tanjong	130
Dumunpalit island	207
Dunlop shoal	128
Duperré eilanden	57
Durangan island	184
Durudeen point	163
Duwit islet	72
East arm ; Halsey harbour	203
East channel ; Labuan	112
East Malcatop island	204
East Malkatop island	204
East Nalaut island	204
East peak	194
Ebeling shoal	44
Edgell patches	132
Egeria bluff	148
El Fraile rock	218
Elet island	206
Elinibinid point	206
Embang, Tanjong ; Saráwak, Sungei	90
Embang, Tanjong ; Sipang peninsula	88
Embeluh, Sungei	77
Emergency point	176
Emilia bay	201
Emmit islet	195
Encarnada point	242
End peak	164
Endeavour :	
Island	175
Point	182
Strait	181
approaches	181
directions	187
Engineer island	222
Engkilili town	95
Eniaran islet	184
Enoe islet	110
Entabula island	189
Enterprise point	178
Entrance island	186
Entrance rock	180
Eran bay	160
Eran point	158
Eran Quoin, Mount	158
Erica reef	197
Escabrosa point	167
Escarpado peak	154
Escucha rock	202
Everett reef	131
Exertion point	182
Fagg reef	245
Fairie Queen shoal	199

Digitized by Google

	Page
Fairley patches	107
Fairway reef	163
False Corumi range	161
False Sharp peak	161
Favorite passage	64
First Thomas shoal	199
Fish bay	167
Flagstaff point	130
Flat island	199
Flat rock; Custodio point	188
Flat rock; Passage island	184
Flat rock; Turung bay	183
Fleming island	183
Flint pass	131
Fortune island, light	216
Four Fathom patches	111
Four Peaks range	168
Fowlers head	178
Frailes, Los	230
Francis bank	139
Friendship shoal	101
Fuego point	216
Fuel oil supplies	22
Furious shoals, North	146
Furious shoals, South	145
Fury rocks	113, 127
Gabot islet	255
Gabot point	255
Gage island	203
Galoc island	204
Galok island	204
Gan bay	255
Ganda, Tanjong	144
Gandan point	155
Gantisan village	133
Gantung, Mount	158
Gantung range	161
Gap range	164
Garu, Sungei	145
Gasap, Tanjong	143
Gaviota rock	228
Gaya:	
Bay	134
anchorage	134
beacon	134
current	134
dangers	134
directions	134
Harbour	135
Head	133
Pulau	132
south and west sides	132
Gedong village	94
Genteng	61
Light	61
Reede	61
Genting:	
Island; Serasan	52
Island; Tambelan eilanden	47
Islet	58
Settlement	61
light	61
Glamis Castle rock	69
Glayzer rock	111
Gloria reef	70
Gnat reef	150
Golgotha head	184
Golo island, light	212
Golo pass	212
Gontin bay	212
Gontin point	212
Gorda point	218
Gordon islands	51
Gordon patches	127
Gosok, Tanjong	116
Grande Guintungauan island	189
Grande island	227
Light	228
Grave point	178
Great lakes	76
Great Natuna island	59
Green head; Malampaya sound	184
Green head; Pagdanan bay	176
Green hill	186
Grieve reef, light	135
Groot Natuna eiland	59
Groot Natuna eilanden	56
Groote Kapoeas rivier	75
Groote Kapuas rivier	75
Groote Sambas rivier	80
Growler bank	127
Guadagi river	229
Guai point	226
Guay bay	226
Guay point	226
Guardia shoal	217
Guecet point	244
Gueritz rock, beacon	148
Gueritz shoal	135
Guinlo settlement	186
Guintungauan island, Grande	189
Guintungauan island, Pequeño	189
Gulang Gulang village	186
Gull rock	185
Gunong = Mountain, *see* proper name	
Gunong, Tanjong	80
Guntao island, North	189
Guntao island, South	189
Gunung, Tanjong	80
Gusu, Tanjong	137
Gutob bay	205
Approaches	205
dangers	205
Hadji	51
Haji	51
Halcon, Mount	209
Half Moon shoal	198
Halfway islet	183
Hall point	174
Halsey harbour	203
Anchorage	203
Approach	203
dangers	203
Directions	203
Hamilo cove	217
Hamilo point	216
Hamilton point	110
Harbour hill	169
Harbour shoal	115

Digitized by Google

	Page
Hardy reef	199
Harington shoal	146
Harris reef	135
Harry shoals	144
Haselfoot patch	126
Haycock, South	50
Hayes reef	101
Haynes shoal	53
Hen and Chickens	167
Henderson point	92
Herald reef	101
Herefordshire shoal	156
Hermana Mayor, light	237
Hermana Menor	237
Herschell, Mount	166
Hewlett reef	135
High Nipple	177
Hill rock, North	143
Hill rock, South	132
Hol, Batu	51
Hooiberg, Noord	57
Hooiberg, Zuid	50
Hopkins reef	199
Hopps reef	199
Horadaba rock	218
Horn, Mount	190
Hornos point	222
Horse island	205
Horseshoe reach; Saráwak, Sungei	91
Hughes droogte	46
Hummock point	161
Hunch hill	186
Hundred islands	241
Hunter rock	208
Huron rock	183
Iagat islet	234
Iba:	
Anchorage	232
Point	232
Town	232
Ibelbel island	185
Ibul	47
Igan, Batang	98
Igan village	98
Igsoso bay	211
Igsoso point	211
Iguana island	203
Iguano head	184
Ilamin bay	228
Illultuk bay	206
Ilog bay; Matinloc island	190
Ilog bay; Palawan	159
Imung, Batu	69
Imuruan bay	176
Imuruan island	177
Imus river	220
Inabuyatan island	193
Inagtapan point	207
Inambuyod island	190
Inambuyod rock	190
Inanam, Sungei	134
Inclined rock	198
Indeh, Tanjong	137
Infanta town	237
Inlulutoc bay	178
Anchorage	178
Inlulutoc head	178
Inlulutok bay	178
Inlulutok head	178
Investigator shoal	197
Investigator shoal, North-east	199
Ipil point	191
Ira-an bay	160
Ira-an river	160
Iris rock	141
Iris shoals	126
Iron Duke shoals	109
Iroquois reef	199
Irving reef	198
Isabel point	161
Islet head	176
Isthmus cone	174
Isthmus point	186
Iwiig range	157
Jabak reef	54
Jackson atoll	199
Jackson reefs	57
Jaga, Pulau	140
Jahat:	
Rock	127
Shoals	127
Tanjong	144
Jaja ridge	108
Jali islet	62
James shoal	100
Janet islet	182
Jangkulak	48
Jangkulan	45
Jantai islet	65
Japu	54
Jarijeh, Tanjong	96
Jaring reef	54
Jela	47
Jepak, Bukit	99
Jesselton harbour	132
Anchorage	135
Approach	132
dangers	132
islands	132
Beacons	134
Dangers	134
Directions	135
Lights	134
Jesselton town	136
Communications	136
Harbour facilities	136
Radio station	21
Signals	136
Trade	136
Jubboom bay	172
Islands and dangers	172
Jip rocks	189
Johnson reef	198
Johnstone bluff	149
Johnstone point	184
Jones bridge; Pasig river	224
Ju, Tanjong	63
Judan, Sungei	98
Junction bluff	137
Junction point, North	89
Junkat	73

Digitized by Google

	Page
Kabalitian island	241
Kabarruyan island	241
Kabatuan, Sungei	133
Kabayok point	226
Kabugao bay	254
Kabugao point	254
Kabuli island	196
Kabung island	79
Kadlao island	191
Kadua, Tanjong	146
Kaeton, Tanjong	137
Kaiholo river	170
Kaju, Ara	46
Kakayatan island	201
Kakbolo island	173
Kaknipa island	173
Kalabangil island	182
Kalabuktung islets	183
Kalabuktung point	182
Kalaguaguin bay	231
Kalaklan point, light	228
Kalaklan river	228
Kalam, Bukit	110
Kalamian group	202
Kalampisauan island	206
Kalampunian, Pulau	147
Light	147
Kalang Bau, Tanjong	80
Light	81
Kalanhayaun island	208
Kalatagan point	215
Kalavite, Cape	209
Light	212
Kalavite, Mount	212
Kalibang island	201
Kalibugon, Mount	158
Kalimantan Barat	74
Kalitan island	196
Kalonhogon islet	184
Kalumbuyan island	204
Kalungpang point	217
Kamago bay	193
Kamago island	181
Kamanga island	208
Kamayan point	227
Kamonga shoal	156
Kampong = Village, *see* proper name	
Kamtas point	211
Kamungyan island	168
Kamuning	84
Kandelaria town	236
Kandon point	248
Kandon town	248
Kangen, Tokong	43
Kanika point	185
Kanimeran islet	153
Kanipan hill	154
Kanipo island	185
Kansea rock	185
Kapala Nanggal	63
Kapala Pandjang, Tanjong	64
Kapala Panjang, Tanjong	64
Kapala Tambelan	46
Kaparayan river	193
Kapit	96
Kapoas :	
Cape	178
Kapoas—*contd.*	
Cluster	179
Low	177
Mount	177
Kapoeas rivier, Groote	75
Kapoeas rivier, Kleine	72
Kapor, Tanjong	147
Kapsalai island	175
Kapsalai reef	175
Kapuas rivier, Groote	75
Tributaries of	76
Kapuas rivier, Kleine	72
Anchorage	73
Beacons	72
Buoy	72
Directions	72
Islands	72
Lights	72
Prohibited anchorage	74
Shoal	72
Kapyas islet	155
Karabao island	217
Karamatan point	175
Karang = Coral reef, *see* proper name	
Karang, Tanjong	66
Karat point	193
Karauisan point	211
Karei bay	132
Karsoglan hill	166
Kartijasa village	81
Kartiyasa village	81
Kataaba, Port	187
Anchorage	188
Kataaba river	188
Katalat island	172
Katalat peak	173
Katiga, Tanjong	143, 146
Kauayan island	191
Kaverna island	191
Kaydoros settlement	172
Kayu, Ara	46
Kebangsi hill	78
Kemai, Mount	59
Kemantau, Tanjong	48
Kembang islet	61
Kemena, Batang	99
Lights	99
Kemudi, Tokong	45
Kemudi village	65
Kepahiang	43
Kepala	52
Kera	48
Kera, Pulau	86
Keran rock	78
Kerdau	54
Ketipu island	75
Ketungau, Sungei	76
Kia, Karang	70
Kianghi, Sungei	123
Kidurong, Tanjong	98
Light	99
Kilatuan	129
Kimanis :	
Bay	129
current	130
Settlement	130
Sungei	129

Digitized by Google

	Page
Kiminaytoi point ; Bacuit bay	193
Kiminaytoi point ; Danet bay	193
Kina Balu, Mount	1, 86, 136
Kinabakbagan reef	233
Kinalang bay	159
Kinandukan peak	129
Kinaran bay	186
Kinarut, Sungei	130
Kinaulugan cove	171
Kindana hill	120
Kingaran, Pulau	121
Kingaran spit	121
Klapperhuk	52
Kleine Kapoeas rivier	72
Kleine Kapuas rivier	72
Kleine Sambas rivier	82
Klias, Sungei	118
Klias, Tanjong	113
Koeboe, Sungei	72
Kokop islet	62
Kolobe shoal	157
Kolokoto rocks	207
Koloma rock	186
Komang	58
Komokutuan islet	193
Koron island	202
Korumi, Mount	158
Kotabelud	141
Koti :	
Hill	51
Passage	53
current	54
dangers	53
Tanjong	52
Kotit peak	48
Kra, Pulau	89
Kramati point	119
Kranga, Tanjong	142
Kring, Tanjong	138
Kuala = Mouth of river, *see* proper name	
Kuap, Sungei	91
Kubi point	228
Kubong bluff	112
Kubu, Sungei	72
Kuching	93
Communication	93
Harbour facilities	93
Radio station	21
Trade	93
Kudat harbour	147
Anchorage	149
Beacons	148
Dangers	148
Directions	149
Light	148
Tidal streams	149
Kudat settlement	149
Buoys	149
Communication	149
Jetty	149
Pier	149
Radio station	21
Kudugman bay	192
Kudugman point	192
Kukup, Tanjong	65
Kulili point	256
Kulion island	202
Kuraman channel	110
Kuraman, Pulau	110
Light	112
Kurina, Sungei	146
La Monja, light	218
Labrador town	244
Labuan island	114
Currency	3
East coast	113
General remarks	2
Health	3
South coast	110
Weights and measures	3
West coast	109
dangers	111
Lagat island	208
Lagen island	193
Lagong, Cape	60
Lagong eiland	58
Laguna de Bay	224
Laiang, Pulau	130
Lajang, Batu	72
Lakei, Pulau	88
Lalutaya island	196
Lama, Kuala	129
Lambier, Bukit	100
Lamina reef	66
Lampa, Tanjong	59
Lampinigan island	177
Landak, Sungei	74
Landargun, Mount	158
Langeblangeban bay	193
Langeblangeban river	193
Langsana islet	148
Laoag river	256
Laoag town	256
Laplace, Straat	58
Lapog :	
Bay	252
Point	252
River	253
Shoal	252
Town	252
Largon islet	180
Largon rock	180
Latu rots	54
Latud point	155
Lauauan island	201
Lauis river	236
Laurel reef	70
Laut :	
Island	69
Karang	49
Rif	55
Lawas, Batang	117
Lawas village	117
Layang Layangan, Tanjong	109
Layar, Batang	95
Leba-An, Batang	96
Ledong point	119
Lelipan, Pulau	124
Lemukutan island	79
Lena shoal	206
Lengkabang bay	148

Digitized by Google

	Page
Leslie bank	200
Leso	47
Lian river	216
Liba, Tanjong	112
Liberty pier ; Victoria harbour	115
Libro point	195
Ligas point	151
Limbang, Batang	124
Approaches	124
Directions	125
Limbang village	125
Limbones cove	217
Limbones island	217
Limit point	216
Linackauan point	184
Linapacan island	200
Islands and dangers west and north of	201
Linapacan strait	202
Islands and dangers	202
Linapakan island	200
Linapakan strait	202
Lingayen gulf	241
Aspect	241
Eastern side	243
beacons	243
dangers	243
light	243
Head of	244
Western side	241
islands and dangers	241
Lingayen town	244
Lingga, Sungei	95
Lingga village	95
Lintang :	
Island	47
Mount	59
Village	92
Lipa village	211
Lipat, Tanjong	134
Lipi	47
Lisang, Bukit	125
Lita, Tanjong	134
Little sound	186
Littledale shoal	109
Livock reef	199
Lobang, Tanjong	100
Light	100
Loggerheads	191
Logong, Tanjong	134
Lokanin point	218
Lokpussok, Mount	137
Lonchit, Mount	71
Loney island	132
Long Lama	104
Long point ; Apurauan	165
Long point ; Bacuit bay	193
Long point ; Jibboom bay	172
Lontjit berg	71
Looc :	
Bay	213
Cove	217
Village	213
Look, *see* Looc	
Lookout point	181
Lord Auckland shoal	199
Los Cochinos	217
Los Frailes islets	230
Louisa reef	101
Loura, Bukit	108
Low Capoas	177
Low Hock	154
Low Kapoas	177
Low Nipple	177
Luan island	234
Luan point	234
Lubang island	212
Islands and dangers north-east of	213
North-east coast	213
off-lying danger	213
South-west coast	212
anchorages	212
Lubang islands	212
Lubang town	213
Lubidan, Pulau	112
Lubutglubut island	208
Luchuk, Mount	59
Luconia :	
Breakers	101
Shoals, North	101
Shoals, South	100
Lugot point	255
Lump island	174
Luna town	247
Lundu :	
Batu	87
Sungei	86
Town	87
Lupar, Batang	94
Directions	95
Islet and dangers	94
Tidal streams	97
Lutjuk berg	59
Lutong	104
Luzon island	215
Western side	215, 226
aspect	226
caution	215
climate and weather	22
Luzon point	226
Lydie shoal	100
Macachin point	206
Macalaba island	233
Macamo point	191
McDougall point	91
Macdowal point	52
Mackenzie-Grieve shoals	127
Macmany point	228
Madagascar rock	199
Madalon, Mount	143
Mafsie, Cape	146
Magalawa island	233
Magdalen bluff, beacons	230
Magpie rock	107
Magsiapo reef	169
Mahaba point	214
Mainganay river	249
Majam, Tanjong	69
Makmany point	228
Malabon, lights	223
Malagan point	170
Malahon island	205

Digitized by Google

	Page
Malajon island	205
Malaka, Mount	84
Malampaya sound	179
Approaches	179
Inner sound	186
anchorage	186
directions	186
north-western approach	184
Inner strait	183
Outer part	182
dangers	182
Malankassan islet	118
Malankassan Dammit	118
Malanut:	
Bay	
anchorage	163
approaches	162
dangers	163
Peak	161
Range	161
River	163
Malaoton island	185
Malapackun island	162
Malapajo river	186
Malapakkun island	162
Malapina island	182
Malavatuan island	214
Malbinchilao island, North	204
Malbinchilao island, South	204
Malcatop island	204
Malcatop island, East	204
Malinta, light	223
Malipu bay	185
Anchorage	185
Dangers	185
Malkatop island	204
Malkatop island, East	204
Mallarois islet	185
Malohom bay	134
Malpacao island	193
Malpakao island	193
Maltatayoc island	204
Maltatayok island	204
Malu reefs	51
Malubutglubut island	201
Malutone islet	186
Mambat	54
Mamburao:	
Bay	211
Reef	211
River	211
Village	211
Mamutik, Pulau	131
Manat, Tanjong	97
Mancha Blanca	230
Mandai, Sungei	77
Mandaui island	214
Mandi Angin, Tanjong	48
Mangalong, Sungei	117
Mangalum, Pulau	138
Mangas point	243
Mangenguei island	204
Mangenguey island	204
Mangle Butuan island	162
Manila bay	217
Buoy	217
Dangers	217
Entrance	217
Manila bay: Entrance—*contd.*	Page
dangers	218
islands	218
lights	218
Signal station	218
Southern side	219
dangers	219
light	219
Western and northern sides	219
Manila city	225
Climatic table	40
Consul	225
Harbour facilities	225
Trade	225
Manila harbour	221
Airport	224
lights	224
Anchorage	221
Approaches	222
Bank	221
Breakwaters	222
Buoys	222
Compass correction	222
Dangers	222
Lights	223
Piers	223
Pilotage	224
Quarantine anchorage	221
Signal station	224
Traffic regulations	221
Typhoon signals	224
Yacht basin	224
Manlag bay	193
Manlalec river	193
Manlalec village	193
Manlalek river	193
Manlalek village	193
Manmegmeg bay	192
Manog point	212
Manolaba island	206
Manolebeng island	206
Mansalauit islet	195
Mansalauit point	195
Mantalingahan, Mount	157
Mantalingajan, Mount	157
Mantanani islands, light	145
Mantangule island	152
Mantaya bay	160
Manukan, Pulau	131
Mapalan point	226
Mapankal point	157
Marabay point	169
Maragaya river	247
Maragondon river	219
Maralie reef	198
Marantao islet	162
Marantongan, Tanjong	117
Margherita, Fort	92
Maricaban light	223
Maricaban island	162
Marie Louise bank	200
Marintaman, Tanjong	117
Mariquit island	162
Mariveles:	
Harbour	218
buoys	218
dangers	218
light	218

Digitized by Google

	Page
Mariveles : Harbour—*contd.*	
typhoon signals	219
Mountains	226
Reef	197
Village	219
Maro, Beting	95
Martin hill	151
Martinez point	152
Marudi town	104
Marudu bay	146
Anchorage	147
Outer part	147
beacons	147
dangers	147
Marudu, Sungei	146
Masbate shoal	253
Masinloc :	
Port	235
anchorages	236
beacons	235
buoys	235
dangers	235
directions	236
River	235
Town	235
Matalvi :	
Island	234
Point	233
Port	233
anchorage	234
beacon	233
buoy	233
dangers	233
directions	234
Matinloc island	190
Matinlok island	190
Matong, Beting	90
Matu, Kuala	98
Matungun	147
Maus, Mount	203
Mayagao point	227
Mayanga islet	228
Light	228
Mayday bay	173
Anchorage	173
Approaches	173
dangers	173
Mayday range	173
Mayne rock	143
Medang, Tanjong	65
Melaban, Tanjong	94
Melajn, Sungei	74
Melalap	3
Melangi islet	62
Melanim, Tanjong	133
Melau besar	147
Melawi, Sungei	76
Meliau village	76
Melintang heuvel	83
Melville, Cape	150
Membákut, Sungei	129
Mempawah, Sungei	77
Mempawah, village	77
Menani, Sungei	129
Mendarik	45
Mengegah	44
Menggatal, Sungei	133

	Page
Mengirang :	
Besar	46
Kechil	46
Tokong	46
Mengkábong bluff	137
Mengkábong, Sungei	137
Menor islet	209
Menpakul village	118
Mentidung village	77
Menzies reef	198
Merah, Tanjong	80
Merangis, Tanjong	133
Merlin shoal patches	160
Merope rock	208
Merundung island, light	50
Micota islet	185
Midai	56
Anchorages	56
Beacons	56
Buoyage	56
Islands and dangers north of	57
Light	56
Off-lying dangers	57
Middle patches	127
Middle reef	175
Middle shoal ; Palawan	167
Middle shoal ; Salomague harbour	253
Mikota islet	185
Millman islet	184
Milner head	173
Mindoro island	209
Western side	209
Mindoro strait	207
Current	209
Miniloc island	190
Minilok island	190
Miri anchorage	102
Anchorage	102
Approaches	102
dangers	102
lights	102
Directions	102
Mooring buoys	102
Pilots	102
Prohibited area and anchorage	104
Tidal streams	103
Miri, Sungei	102
Miri town	103
Communication	103
Harbour facilities	103
Regulations	103
Trade	103
Mischief reef	199
Mitre islet	191
Monja, La	218
Light	218
Montalay hill	158
Montrado	27
Moorsom point	165
Morison island	175
Moron shoal	227
Moron town	227
Muara = Mouth of river, *see* proper name	
Muara :	
Bar	120
Harbour	120
beacons	120

Digitized by Google

	Page
Muara—*contd.*	
Outer bar	118
Pulau	119
Spit	116
Telok	68
Muara Tebas entrance	89
Anchorages	91
Beacon	89
Buoy	90
Dangers	89
Directions	91
Lights	89
Regulations	93
Signal stations	92
Tidal streams	92
Muara Tebas, Tanjong	90
Muglavis village	255
Mukah, Batang	98
Mukah town, light	98
Mulu, Gunong	106
Mundaga	57
Munggu Resak hill	84
Munggu Resak, Tanjong	84
Murex shoal	156
Muri	50
Nabasan point	228
Nagabungan bay	257
Nagapu, Mount	250
Nagcaban point	229
Nakoda bay	162
Anchorage	163
Approaches	162
dangers	162
Nakoda island	162
Nalaut island, East	204
Nalaut island, West	204
Nalvo bay	249
Nanga island	201
Nanga islands	207
Nangah Embeluh	77
Nangah Kalis village	77
Nangah Pinoh village	76
Nangah Serawai village	76
Nangka	47
Nankivell rock	109
Nanshan island	199
Nap rocks	89
Napindam	224
Napo point	226
Narra island	240
Narvacan, Mount	250
Nasugbu:	
Bay	216
Point	216
Town	216
Natib, Mount	226
Natuna eiland, Groot	59
North-eastern side	67
aspect	67
South-eastern side	65
islets and dangers	65
Southern side	59
aspect	59
dangers	59
Western side	60
Natuna eiland, Noord	69
Natuna eiland, Zuid	50
Dangers	50
Lights	50
Natuna eilanden	50
Natuna eilanden, Groot	56
Naulo point	236
Navotas	220
Nazasa bay	231
Needle rocks	181
Neneh, Batu	60
Niah, Batang	100
Niaporai island	174
Niaporai rock	174
Niaporay island	174
Niaporay rock	174
Nibung	47
Niger bank	85
Ninepin islet	194
Ninepin rock	172
Nipa river	98
Nipple, The	161
Nob islet	145
Noord Hooiberg	57
Noord Natuna eiland	69
Normanhurst reef	135
North arm; Halsey harbour	203
North Balabac strait	152
North Bar bank; Brunei, Sungei	122
North bay; Endeavour strait	181
North bay; Linapacan island	201
North Borneo, State of:	
Communications	3
Currency	4
General remarks	3
Government	3
Harbours	3
Products	3
Trade	3
Weights and measures	4
North cay; Maltatayoc island	205
North channel; Manila bay	217
North channel; Pratas reef	259
North Furious shoals	146
North Guntao island	189
North harbour; Manila bay	225
North hill; Palawan	195
North Hill rock	143
North inlet; Ulugan bay	169
North Junction point	89
North Luconia shoals	101
North Malbinchilao island	204
North Natuna islands	69
North Regent shoal	156
North rock; Palawan	166
North shoal; Salomague harbour	253
North Tuluran	180
North-east Antelope shoal	157
North-east bay; Malampaya sound	182
North-east Bay island	182
North-east Investigator shoal	199
North-east point; Pratas island	259
North-west bay; Linapacan island	200
North-west head; Palawan	167
North-west hill; Palawan	167
North-west rock	207
North-western shoals	151

Digitized by Google

	Page
Nosong :	
Mount	126
Patch	126
Shoals	127
Tanjong	126
Notch island	180
Nyabau, Bukit	98
Nyalau, Kuala	100
Observation rock	198
Observatory rock	170
Olak Olak, Tanjong	72
Olanin bay	239
Olanin river	239
Olongapo, Port	229
Anchorage	230
Beacon	229
Buoys	229
Dangers	229
Directions	230
Lights	229
Olongapo village	229
Communications	230
Harbour facilities	230
Orani river	220
Orion hill	219
Otter rock	91
Otterspool rock	109
Outer shoal ; Victoria harbour	114
Oya, Batang	98
Lights	98
Oya village	98
Oyon bay	235
Oyon point	235
Oyster :	
Inlet	170
Point	175
Rocks	121
Pabilat point	193
Pachil, Batu	51
Padang Tikar, Sungei	71
Padas bay	117
Padas, Sungei	117
Pagauanen point	188
Pagdanan :	
Bay	176
anchorage	176
dangers	176
directions	176
Peninsula	176
Point	173
Range	176
Rock	174
Paglugaban island	189
Pagoda cliff	157
Pajung :	
Batu	78
Berg	63
Tanjong	63
Palauig :	
Bay	233
Point	232
light	233
Reef	233
Town	233
Palawan island	154
Islands and dangers north-east of	200
Palawan passage	197
Palcocotan islet	184
Palempa village	52
Palilo islet	190
Palkokotan islet	184
Palm islet	163
Paloh :	
Batang	98
Kuala	97
Reede	83
Sungei	83
approaches	83
directions	84
tidal streams	84
Palomonti rocks	217
Paluan :	
Bay	211
anchorage	211
River	211
Town	211
Pamalican islands	205
Pamalikan islands	205
Pamatadau river	148
Pamocan point	228
Pamokan point	228
Pampanga bay	220
Pampanga river	220
Pamuit river	98
Pamutusin cove	211
Panacalan islet	241
Panaen islet	240
Pancol settlement	186
Panda islet	63
Pandan :	
Bay	210
Islands	210
Point	219
Village	251
Pandanan island	153
Pandang village	65
Pandaruan, Sungei	125
Pandil islet	226
Pandjang ; Kapuas rivier, Kleine	72
Pandjang ; Natuna, Groot	63
Pandjang ; Natuna, Zuid	54
Pandjang ; Tambelan eilanden	47
Pandjang, Straat	65
Directions	65
Panduan, Pulau	131
Panga Sinan province	5, 244
Pangaldauan island	202
Pangallat, Tanjong	130
Pangi, Mount	85
Pangka'an bay	148
Pangulasian island	189
Panibatujan point	227
Panimusan point	155
Panjang, *see* Pandjang	
Pankol settlement	186
Pantocomi point	211
Pantokomi point	211
Pao bay	242
Paodat point	171
Papak, Tanjong	63

Digitized by Google

	Page
Papar :	
Sungei	129
Tanjong	129
Town	130
Pappan, Pulau	113
Light	113
Paragua ridge	160
Parakan, Tanjong	81
Parit village	69
Park point	51
Parmidiaran point	181
Parsons shoal	100
Pasag river	220
Pasig river	224
Tidal streams	225
Pasir = Sand, *see* proper name	
Pasir islet	61
Pasir, Tanjong	66
Passage :	
Island	183
Island bay	183
Point	185
Reef	173
Passages	22
Pasungol town	251
Patawan islet	152
Patelan island	163
Patjil, Batu	51
Patongong islet	153
Patu, Pulau	98
Patuyo point	196
Pauican point	213
Pauikan point	213
Payang, Muara	96
Payong, Tanjong	100
Payung :	
Batu	78
Mount	63
Tanjong	63
Paz islet	152
Peaked island ; Worcester strait	180
Peaked islet ; Cuckold hill	164
Peaked islet ; Malampaya sound	185
Peaked point ; Jibboom bay	172
Peaked point ; Tuluran island	180
Peaked rock ; Escabrosa point	167
Peaked rock ; Kingaran, Pulau	121
Peaked rock ; Mayday bay	173
Peanjamuk	52
Pearson reef	198
Pedjamu	43
Pedjantan	44
Peel, Mount	166
Pejamu	43
Pejantan	44
Pekak	81
Peling	47
Pelong rocks	111
Pemangkat :	
Mount	81
Reede	81
Village	81
Pemutus, Selat	60
Penaga, Bukit	133
Penarik, Sungei	62
Penarik village	65
Penata besar	79
Penata kechil	79
Penau	43
Pending	91
Signal station	92
Penganak islet	62
Penganak Senua	68
Pengedak, Tanjong	68
Pengibu eilanden	46
Pengiki besar	44
Pengiki kechil	44
Penibungan heuvel	80
Penibungan islet	77
Peninjauhan, Bukit	125
Penu, Batu	70
Pennsylvania North reef	200
Penungul reefs	66
Penyok, Telok	89
Penyu, Kuala	129
Pequeña Guintungauan island	189
Pequeña island	228
Perajun	51
Perayun	51
Perhantuan islet	51
Perigee shoal	156
Perigi, Gunong	87
Pertama, Tanjong	146
Perunjuk, Tanjong	139
Petch reef	199
Petulant point	174
Philippine islands	4
Buoyage, Uniform system of	5
Communications	5
Currency	5
Deratisation	7
Earthquakes	4
Fauna	4
Flora	4
Government	5
Harbour regulations	6
Physical features	4
Pilotage	7
Population	5
Port of Entry	5
Products	5
Trade	5
Weights and measures	5
Pian Padang hill	60
Pian Padang, Tanjong	60
Picanayas island	190
Piedra point, light	239
Piedras point	168
Pig point	188
Pilang besar	48
Pilang kechil	48
Pillar :	
Point	180
Rock ; Nasugbu bay	216
Rock ; Worcester strait	180
Pin point	187
Pin rock	247
Pinagpanacan point	188
Pinalobo, Mount	231
Pinang Kuning	44
Pinang Seratus	43
Pinang Seribu	43
Pindasan :	
Plain	142
Sungei	142
Village	142

Digitized by Google

Page

Pine point 126
Pine Point shoals 126
Pinget island 251
Pinnacle rock ; Busuanga . 206
Pinnacle rock ; Guntao island, North 189
Pinsail islet 194
Pirate bay 182
Pirate point 147
Pirates Hold 182
Pisang hill 108
Pisang islet 62
Plan, Telok 99
Plompong, Pulau . . . 135
Po, Tanjong 90
  Light 90
Poengoer besar, Sungei . . 72
Poetoes, Tanjong . . . 72
Point hill 161
Polompong point, beacon . . 116
Pontianak :
  Islet 83
  Reede 72
    anchorage 72
  Town 74
    climatic table . . . 38
    communications . . 74
    dock 74
    harbour facilities . . 74
    light 74
    piers 74
    pilots 74
    tidal streams . . . 74
    trade 74
Popolcan islet 189
Popolkan islet 189
Popototan island . . . 204
Poro village 245
Port, *see* proper name
Porter patch 107
Portuguese point . . . 242
Postiljon rotsen 57
Postillion rocks 57
Pratas island 258
  Currents, tide-rips . . 260
Pratas reef 258
Preston shoal 140
Prima Donna reach . . . 91
Prima Donna rock . . . 93
Pritchard bank 139
Providencia point . . . 155
Pucot river 219
Pugguiauan point . . . 183
Pulau = Island, *see* proper name
Pulipo islet 236
Pulog, Mount 4
Pulute range 161
Pumubabung reef . . . 54
Punei, Tanjong 109
Pungur besar, Sungei . . . 72
Punta Baja harbour . . . 159
Punyet, Pulau 108
Puter Djala 48
Puterjala 48
Putus, Tanjong 72
Putus Sibao 75
Pyramid rocks 180

Page

Queens bay 175
Queens Bay peak . . . 173

Radak hill 71
Radio stations 21
Ragged islet 188
Rainbow reef 89
Raja Mount ; Borneo, west coast . 71
Raja gebergte 77
Raja hill ; Sambas rivier, Groote . 81
Rajang :
  Batang 96
    anchorage 96
    beacon 96
    directions 96
    light 96
    pilots 96
  Town 96
Rakit :
  Batu ; Penata besar . . 79
  Batu ; Tambelan eiland . . 48
  Eilandje ; Tambelan eiland . 48
  Eilandje ; Uwi eiland . . 49
Rambler banks 122
Ramos island 151
Ramsay point, signal station . 113
Ranai :
  Gebergte 67
  Telok 67
    anchorage 67
    dangers 67
    directions 67
  Village 67
Randajan island . . . 78
Rat island 204
Raton islet 237
Raya hill 81
Reed bank 200
Reef islet 169
Reef point 176
Regatta island 175
Regent shoal, North . . . 156
Regent shoal, South . . . 156
Relinquish head . . . 182
Rena point 239
Repairs 22
Reposo point 155
Research channel . . . 203
Research reef 244
Restinga point 217
Reyne shoal 142
Rhodes island 203
Ria rots 55
Richardson point . . . 110
Richmond reef 101
Riddle point 174
Rikel 52
Riripayan point . . . 241
Rita island 170
River point 121
Rivera point 229
Rizal shoal 139
Roberton hill 140
Robin Hood reef . . . 54
Robins point 169
Rocky islet 90

Digitized by Google

	Page
Rodger rock	45
Rodney Mundy shoal	140
Ross, Cape	178
Routh bank	199
Royal Captain shoal	198
Royal Charlotte reef	101
Royalist :	
Haven	52
anchorages	53
beacons	52
dangers	52
directions	53
light	52
Mount	143
Rock	89
Shoal	174
Ruru, Sungei	146
Rusukan besar	110
Rusukan kechil	110

NOTE.—All names prefixed by Saint, San, Santa and Santo will be found indexed in alphabetical order immediately after the letter S.

S. Amalia rock	218
S. Antonio Abad, Fort	224
S. Cruz :	
Harbour	238
anchorages	238
approaches	238
dangers	238
directions	238
Point	236
Town ; Dasol bay	237
Town ; Luzon, west coast	238
S. Diego point	216
S. Esteban point	248
S. Esteban, Port	249
S. Fabian town	244
S. Felipe town	232
S. Fernando :	
Harbour	245
anchorage	246
buoys	245
caution	246
dangers	245
directions	246
lights	245
pilotage	245
Point	243
light	243
Town	246
S. Ildefonso harbour	252
S. Isidro, Mount	244
S. Jose wharf	218
S. Joseph rock	139
S. Juan town	247
S. Lucia	248
S. Maria church	249
S. Narciso town	232
S. Nicolas settlement	201
S. Nicolas shoals	219
Light	219
S. Paul :	
Bay	171
Mount	168
Rock	171
S. Petrus islet, light	50
S. Petrus rots	50
S. Roque	220
S. Tomas :	
Anchorage	244
Mount	241
Town	244
Sabai islet	63
Sabalay reef	236
Sabandar, Bukit	108
Sabangan village	248
Sabang Barat village	56
Sabangar reef	62
Sabina shoal	199
Sablayan :	
Anchorage	210
Point	210
Town	210
Sadap, Tanjong	49
Saddle :	
Hill	177
Island	181
Islet	174
Rock	203
Sadok Sadok, Gunong	137
Sadong, Batang	94
Sagumay point	169
Sahi rock	68
Sail rocks	207
Saint, *see* under S	
Sak, Tanjong	140
Sakat, Tanjong	112
Sala point	213
Salasa river	233
Saleh, Tanjong	72
Salirong, Tanjong	120
Salomague :	
Harbour	253
anchorage	253
buoys	253
dangers	253
directions	253
light	253
Island	253
Point	253
Town	253
Salor island	62
Salvacion island	205
Salvacion town	205
Salvador head	234
Salvador island	234
Samarago islet	63
Samarahan, Batang	93
Samarang bank	127
Samarang rocks	92
Sambas :	
Reede	82
Rivier, Groote	80
beacons	80
directions	81
light	80
obstruction	80
prohibited anchorage	82
Rivier, Kleine	82
beacons	82
directions	82
tide-gauges	82
Village	82

Digitized by Google

	Page
Sampadi, Pulau	87
Sampaloc point	230
Sampalok point	230
Sampanmangio, Tanjong	146
San, *see* under S	
Sandilands rock, light	148
Sandy shoal	200
Sangbauen	168
Sanggau settlement	76
Sanggau, Tanjong	77
Sangley point, light	220
Santa, *see* under S	
Santa town	251
Santiago :	
Cape	215
light	215
Cove	248
anchorage	248
dangers	248
directions	248
Island	240
Town	248
Santo, *see* under S	
Santubong entrance	88
Buoy	88
Dangers	88
Directions	89
Tidal streams	89
Santubong, Gunong	87
Sanz island	152
Saoang village	252
Saoit point	239
Sapangar bay	133
Sapangar, Pulau	133
Sapo point	118
Beacon	119
Saracen bank	138
Sarangtiong, Pulau	118
Saráwak, Sungei	87
Anchorages	91
Approaches	87
Aspect	87
Directions	91
Pilots	91
Prohibited anchorage	92
Tidal streams	92
Saráwak territory :	
Communications	2
Currency	2
General remarks	1
Government	2
Ports	2
Products	2
Rivers	2
Shipping	2
Trade	2
Weights and measures	2
Sari peninsula, Bukit	117
Saribas, Sungei	95
Sarikei	96
Satang besar, Pulau	88
Satang kechil, Pulau	88
Sauh, Tanjong	138
Saundal bay	140
Saundal, Tanjong	140
Savage island	175
Say, Bukit	108
Saysain point	226
Scalesby Castle shoal	161
Scarborough reef	258
Scott, Mount	106
Scout patches	108
Scout rock	109
Se Batu, Sungei	82
Seahorse bank	199
Seahorse breakers	101
Seamer point	186
Sebangkau, Sungei	80
Sebetul rock	69
Sebiang	54
Sebintang, Tanjong	65
Seblat village	56
Sebuboh, Tanjong	117
Sebung hill	63
Sebuyau, Kampong	94
Sebuyau, Sungei	94
Secam island	152
Second Thomas reef	199
Sedanau island	60
Islands and dangers north of	62
Sedanau town	61
Sededap island	57
Sedua :	
Besar	48
Island ; Natuna eilanden, Groot	64
Islet, Sarasan	52
Kechil	48
Seduku, Pulau	95
Sedungus, Tanjong	89
Segun	43
Sekadau village	76
Sekajan, Sungei	76
Sekatung islet	69
Sekayan, Sungei	76
Sekuju, Sungei	84
Sekukur islet	60
Sekunang heuvel	80
Sekunjam, Mount	59
Sekuyu, Sungei	84
Selabat, Tanjong	90
Selahang, Telok	68
Selakau, Reede	80
Selakau, Sungei	80
Selalang, Tanjong	95
Light	96
Selamok, Pulau	124
Selat = Channel, strait, *see* proper name	
Selebes, Tanjong	75
Selentang hill	58
Selimbau village	75
Selimu island	64
Selintang	47
Seluan island	64
Seluas islet	79
Semalah	60
Semama	63
Semapi reef	64
Semarung islet	61
Semasin	59
Sematan, Sungei	87
Sembuni reefs	50
Semesa island	78
Semitau	75
Semiun island	69
Sempadi	52

Digitized by Google

	Page
Sempang Asam	82
Semulut, Tanjong	60
Semut, Tanjong	63
Sendulang besar	48
Sendulang kechil	48
Sengat rock	69
Sengiap, Telok	68
Senua island	68
Senua, Straat	68
Senubing hill	67
Senubing, Tanjong	67
Separoh	75
Serabang, Tanjong	86
Serabang, Telok	86
Seraia	53
Seraja	53
Serantas	59
Serapi, Gunong	87
Serasa village	120
Serasan eiland	51
Serasan passage	51
Serdang reef	55
Seria oilfields	106
Seribillas point	190
Serungus islet	61
Serval rif	60
Setegas hill	66
Sharp peak; Brunei	108
Sharp peak; Palawan	157
Sharp peak, False	161
Shelter point	142
Siakok hill	80
Siapar island	240
Siapar point	240
Sibu town	96
Sibungor, Pulau	124
Sibuti, Sungei	100
Sicud point	158
Sientu, Mount	59
Sierra Madre	215
Signal head	179
Signals	16
Sigumay point	151
Silabu, Bukit	94
Silanganan, Mount	226
Silanguin island	230
Silanguin, Port	230
Silaqui islet	240
Silat village	76
Silemut, Mount	59
Silk rock	109
Silungen, Gunong	99
Simanggang town	95
Similajau, Kuala	99
Similajau, Tanjong	99
Simo banks	216
Simpson channel	122
Simunjan	94
Sin Cowe island	198
Sindian, Tanjong	132
Singkawang:	
Baai van	80
Reede	80
Sungei	80
light	80
Town	80
Sinjataan, Pulau	132
Sintang village	75
Siol, Bukit	89
Siol, Sungei	88
Sipang, Tanjong	86
Sipitang, Sungei	117
Sipitang village	117
Sir James Brooke range	143
Sireh, Tanjong	87
Sirik, Tanjong	97
Light	97
Sirinao island	162
Siru besar, Sungei	87
Sisiman bay	218
Sisiman village	218
Sitindjan eiland	78
Sitinjan island	78
Sitompok	129
Sjakok	80
Slime rock	141
Slip point	182
Snake rock	132
Sobatan, Karang	46
Soeka Lanting	75
Solot point	254
Solvec:	
Cove	250
anchorage	250
dangers	250
directions	250
Point	250
Rock	250
Village	250
Sosok settlement	76
South Bar bank; Brunei, Sungei	122
South cay; Maltatayoc island	205
South channel; Halsey harbour	203
South channel; Jesselton	132
South channel; Manila bay	217
South channel; Pratas reef	259
South Furious shoals	145
South Guntao island	189
South harbour; Manila bay	222
South Haycock	50
South Hill rock	132
South inlet; Ulugan bay	169
South Luconia shoals	100
South Malbinchilao island	204
South Natuna islands	50
South Regent shoal	156
South rock; Palawan	166
South rock; Scarborough reef	258
South Tuluran	180
South-east bend; Pratas reef	259
South-west shoal	253
South-western banks	151
Southampton reefs	199
Spaoh village	95
Sprat point	167
Squall point	176
Square islet	172
Square point	172
Standard time	22
Station hill	143
Stavely, Mount	166
Steep hill	155
Steep point	164
Steepfall range	150
Stigant reef	101

Digitized by Google

	Page
Stumps islet	186
Suai, Batang	100
Sual, Port	242
Anchorage	243
Dangers	242
Directions	243
Sual town	243
Subi :	
Besar	54
Eilanden	54
anchorages	55
Kechil	55
light	55
Subic bay	227
Anchorage	229
Buoyage	227
Directions	229
Islands and dangers	227
Lights	227
Prohibited anchorage	229
Subic town	229
Submarine cables	20
Submarines ; Netherlands	21
Sueste point, light	228
Sugara, Pulau	131
Suka Lanting	75
Sulaman, Sungei	137
Sultan peak	164
Sulug, Pulau	131
Sumurumsum point	158
Sunda :	
Bank	116
Islet	116
Spit	116
beacon	116
Sungay, Mount	222
Sungei = River, *see* proper name	
Suniatan range	129
Sunk rock	141
Sunken Barrier shoals	139
Suso point	249
Suso shoal	249
Swallow reef	101
Swanley rock	54
Taal, Lake	5
Taal volcano	5
Tabahin bay	212
Tabajin bay	212
Tabi, Tanjong	60
Table hill	98
Table point	167
Tabones islets	231
Tacbolo island	183
Tacbolo passage	183
Tagapolo point	235
Tagaporo island	240
Tagbac cove	212
Tagbak cove	212
Tagbita bay	155
Tagbuaya :	
Bay	160
Point	160
River	160
Tagipan river	158
Tagnipa inlet	169
Tagnipa peak	168
Tagudin town, light	247
Tagugsom bay	154
Taitai bay	183
Directions	187
Taitai islet	183
Tajan, Sungei	76
Tajan village	75
Tajau, Tanjong	147
Takat besar	117
Takat Mengal	117
Takbolo island	183
Takbolo passage	183
Talabasi point	210
Talampulan island	205
Talang Talang, Pulau	87
Talang Talang kechil, Pulau	87
Talbaguen islet	185
Talin bay	216
Talin point	215
Talinas islet	213
Talisain bay	231
Tambak, Tanjong	89
Tambalanang islet	191
Tamban	47
Tambelan :	
Baai	49
anchorage	49
beacons	49
dangers	49
Eiland	48
Eilanden	46
dangers	46
north-eastern group	48
outlying dangers	49
south-western group	46
Tambobo point	239
Tambove roads	238
Tamburong, Sungei	124
Tambuyukon, Mount	137
Tampassuk, Sungei	142
Tamurung point	248
Tandjung, Tanjong	68
Tandoyong islet	241
Tangah bay	140
Tangah, Tanjong	140
Tangut rock	126
Tanjaru	44
Tanjong = Point, *see* proper name	
Tanju, Beting	91
Tanjung, Tanjong	68
Tanobon island	207
Tantangon island	204
Tapiutan island	190
Tara island	208
Tarakaiawan islet	170
Tarak Tarak, Tanjong	133
Taras, Tanjong	113
Targett rock	147
Taritip point	150
Tatau :	
Batang	98
Tanjong	98
Tatub point	156
Tawang, Sungei	76
Tayan village	75
Taytay village	186
Tebeian besar	51

Digitized by Google

	Page
Tebeian kechil	51
Tebelong, Bukit	129
Tebon	43
Tega :	
Channel	128
Pulau	128
Shoals	128
Tegarangan river	148
Telok = Bay, *see* proper name	
Telok Koempai village	75
Telok Kumpai village	75
Telok Labu village	58
Teluk, Tanjong	139
Telur, Pulau	139
Temadju eiland	78
Temaju island	78
Tembelai	55
Tembongan river	98
Templer bank	200
Tempurung island	78
Tenabian island	182
Tenabian passage	182
Tengah :	
Karang	47
Sungei	60
Village	60
Tennent reef	198
Tent islet	188
Teodore point	178
Terandjun, Tanjong	78
Teranjun, Tanjong	78
Terdjoen heuvel	71
Terdjun hill	71
Tern rock	148
Terumi, Bukit	125
Tetas de Santa	250
Thumb peak ; Palawan	166
Thumb peak ; Tuluran island	180
Thumb rock	173
Tiawir river	219
Tide-pole island	163
Tidepole point	170
Tiding river	98
Tigasamil spit	148
Tigasamil, Tanjong	147
Tilig, Port	213
Timahobe, Mount	77
Timor Laut, Tanjong	138
Tinamandukan	129
Tinjar, Batang	104
Tinson reefs	131
Titangcob island	202
Titangkob island	202
Tjatuk berg	59
Tjermai, Sungei	84
Tokong = Reef, *see* proper name	
Tokong rock	60
Tombac bay	241
Tongkok village	69
Torajun, Tanjong	133
Toritori point	241
Tortuga reef	236
Town reach ; Saráwak, Sungei	91
Treacherous bay	163
Approaches	163
Tree island	145
Triboa bay	228
Trident shoal	111
Trikkan, Batu	106
Trinchera point	240
Triple Cima island	162
Triple head	180
Triso, Pulau	94
Triso Darat	94
Truro shoal	258
Trusan, Batang	121
Tua island	83
Tuaran, Sungei	137
Tubau village	99
Tubile point	210
Tubili point	210
Tudang	55
Tudjuh eilanden	42
Climate and weather	22
Currents	42
Tidal streams	42
Tuju islands	42
Tukak, Telok	59
Tukong Ara, Pulau	88
Tukong Banun, Pulau	88
Tulak, Tanjong	112
Tuluan Cut off	183
Tuluran :	
Island	180
North	180
Point	180
South	180
Tuman, Karang	70
Tumbaga point	213
Tundalara, Mount	205
Turnabout reach	91
Turtle island	128
Turtle rock	87
Turung bay	183
Turung islet	183
Tutong, Sungei	106
Tutong village	107
Two Fathom rock	109
Ubugan point	191
Udar :	
Kechil	133
Priok	133
Pulau	133
Ukong village	125
Ulak Pauh	77
Ulu, Sungei	66
Ulugan bay	168
Anchorage	171
Approaches	168
islands and dangers	169
Aspect	168
Directions	171
Tidal streams	171
Umpohl shoals	143
Undaunted rock	110
Union banks and reefs	198
Untuk	47
Usukan bay	141
Anchorages	142
Dangers	141
Directions	142
Usukan, Pulau	141
Uwi island	48
Uwi, Tokong	45

Digitized by Google

	Page
Valley Cone	164
Vanguard shoal	160
Vanguardia islet	200
Verdier rif	59
Vernon bank	127
Victoria :	
Harbour	114
anchorages	115
beacons	114
buoys	114
dangers	114
directions	115
prohibited anchorage	115
Patches	108
Peaks	164
Town	115
caution	115
communication	116
harbour facilities	116
radio station	21
shipping	116
trade	116
Vigan gap	250
Vigan town	251
Climatic table	41
Vigia point	226
Village point	226
Village bay	174
Vinalo islet	185
Vitas river	221
Vito island	196
Wangkang, Batu	71
Wangle, Mount	154
Warren point	93
Waterfall peak	161
Watering bay ; Mayday bay	173
Watering bay ; Ulugan bay	169
Wawa river, light	216
Wedge :	
Head	183
Island	176
Islet	175
Welcome point	155
Welstead shoal	45
West Nalaut island	204
West York island	198
Western shoals	151
Weston	3, 118
White Conical head	178
White island	178
White point	182
White Point islet	187
White rock ; Bigun bay	192
White rock ; Kemudi	66
White rock ; Kudat harbour	149
White rock ; Malampaya sound	184
White rock ; Ulugan bay	170
White rock ; Worcester strait	181
White rocks	144
White Rocks bay	144
Anchorage	144
Approaches	144
dangers	144
Directions	144
White Rocks reef	144
White Round islet	180
Whitsun reef	198
Wilson head	174
Wilson islet	182
Winchester shoals	127
Witti rocks	148
Woody peak	108
Worcester strait	180
Tidal streams	187
Wreck head	178
Yapusan point	212
York breakers	165
York island, West	198
Yu, Tanjong	138
Zambales province	232
Zoe islet	172
Zuid Hooiberg	50
Zuid Natuna eilanden	50

Digitized by Google

PUBLICATIONS

of the

HYDROGRAPHIC DEPARTMENT

A complete list of the Sailing Directions, Charts and other works published by the Hydrographic Department of the Admiralty, together with a list of Agents for their sale, is contained in the "Catalogue of Admiralty Charts and other Hydrographic publications," published annually.

The list of Agents, referred to above, and from whom this catalogue can be obtained, is also promulgated in Admiralty Notice to Mariners No. 2 of each year.

Printed in Great Britain under the authority of HIS MAJESTY'S STATIONERY OFFICE
by Butler & Tanner Ltd., Frome and London.

Ps. 11732. Wt. 49362/H4246. 3/51. B. & T. Ltd. Gp. 460/1.

Digitized by Google

Digitized by Google

Digitized by Google

Digitized by Google

31

SUPPLEMENT No. 2—1954

RELATING TO THE

CHINA SEA PILOT

VOL. II

SECOND EDITION, 1950

CORRECTED TO 17th MAY, 1954

Whenever reference is made to the Pilot, this Supplement must be consulted

Crown Copyright Reserved

LONDON
PUBLISHED by the HYDROGRAPHIC DEPARTMENT, ADMIRALTY

To be obtained from the
Agents for the Sale of Admiralty Charts

1954

Gratis to purchasers of China Sea Pilot, Vol. II

Digitized by Google

Digitized by Google

ADVERTISEMENT TO SUPPLEMENT No. 2

This Supplement has been compiled by Captain F. J. B. Gibson, O.B.E., R.N., from information received in the Hydrographic Department of the Admiralty since the publication, in 1950, of the second edition of the China Sea Pilot, Vol. II.

The Supplement should be retained intact for reference ; its existence is to be entered on the tabular form inside the cover of the Pilot.

Whenever reference is made to the Pilot, this Supplement must be consulted.

Attention is drawn to the portions which differ from the *previous Supplement* and which are indicated in the following manner :—

Additions and alterations are enclosed by broad square brackets in heavy type.

Deletions are indicated by a heavy horizontal line.

Supplement No. 1, 1952, is hereby cancelled and all information affecting the China Sea Pilot, Vol. II, contained in Notices to Mariners, up to and including No. 1125 of 1954, has been embodied in this Supplement ; for temporary and preliminary Notices to Mariners affecting this edition, the list of temporary and preliminary Notices to Mariners in force, published monthly in the complete weekly edition of the Admiralty Notices to Mariners, should be consulted.

A. DAY,
Vice-Admiral,
Hydrographer of the Navy.

Hydrographic Department,
Admiralty, London,
17th May, 1954.

1562964

Digitized by Google

SUPPLEMENT No. 2, 1954

relating to the

CHINA SEA PILOT

VOL. II

SECOND EDITION, 1950

(*Corrected to 17th May, 1954*)

CAUTION on front cover.—Line 3: *For* "**16**" *read* "**[19]**"
N.M. No. 3.: *For* "**BRITISH OFFICIAL**" *read* "**OFFICIAL**" and *for* "**MERCHANT**" *read* "**BRITISH MERCHANT**"
N.M. No. 9: *For* "**W/T AND R/T**" *read* "**RADIO**"
Below **N.M. No. 16** *insert*:—
No. 17 REPORTS OF SHOALS OBTAINED BY ECHO SOUNDING.
No. 18 AREAS DANGEROUS DUE TO MINES.
[No. 19 THE INTERNATIONAL HYDROGRAPHIC BUREAU.]

CAUTION facing page ii: Tenth paragraph: Line 1: *For* "**STEAM**" *read* "**POWER**"

[Page xv.—*Above* Page heading *insert*:—

LAWS AND REGULATIONS APPERTAINING TO NAVIGATION.

While, in the interests of the safety of shipping, the Admiralty make every endeavour to include in their hydrographic publications details of the laws and regulations of all countries appertaining to navigation, it must be clearly understood:—

(*a*) *that no liability whatever can be accepted for failure to publish details of any particular law or regulation, and*

(*b*) *that publication of the details of a law or regulation is solely for the safety and convenience of shipping and implies no recognition of the international validity of the law or regulation.*

[Page xvi.—Line 14: *Delete* and *substitute*:—
"(*ii*) Prior to 1954, when a chart was corrected from information which was"]
[Line 16: *For* "is" *read* "was"]
[Line 18: *For* "are" *read* "were"]
[Line 24: *For* "indicate" *read* "indicated"]
[Line 25: *After* "respectively" *insert* ",which would appear on later printings"]
[Lines 27, 28: *For* "are" *read* "were"]
[Line 29: *For* "may" *read* "might"]
[Line 32: *For* "does" *read* "did"]

Digitized by Google

Page xvi continued.

[*After* line 32 *insert* :—

(*iii*) Since 1954, in order that more attention may be given to New Editions, Large Corrections and corrections by Notices to Mariners, and for other reasons, the making of minor amendments to Chart plates as in (*ii*) has been discontinued. Information of no importance to safe and convenient navigation is instead recorded for inclusion in the next New Edition or Large Correction ; or, for promulgation in a later Notice to Mariners should a change of circumstance alter the importance of the information.

In consequence the small correction date enclosed in a rectangle does not appear later than 1953 on navigational charts. The date within brackets may still appear and is then an indication that magnetic compasses have been corrected for a change in variation.]

Page xix.—Lines 4-6 : *Delete* " Matter " to " brackets." and *substitute* :—New additions or alterations to the Supplements are enclosed by broad square brackets in heavy type ; deletions are indicated by a heavy horizontal line.

Lines 16-17 : *Delete* " published " to " month " and *substitute* " normally published annually,"

Line 18 : *For* " will not be " *read* " are not "

Lines 20, 22 : *For* " will be " *read* " is "

Lines 27, 31 : *For* " IIIA " *read* " III "

Lines 33-34 : *Delete* " Section " to " character."

[Line 43 : *For* " in three volumes." *read* " as follows :— "]

[Lines 46-48 : *Delete* " radio," to " ships." and *substitute* " radio."]

[Lines 51-52 : *Delete* " , together " to " signals) " and *substitute* " including air radiobeacons useful to ships ; also stations giving QTG service and calibration stations "]

[Line 54 : *After* " III " *insert* " (Part A) "]

[Line 56 : *Delete* and *substitute* :—

" relevant codes.

Volume III (Part B).—Meteorological Observation Stations.

(*Note* : *Future editions of Parts A and B will be known as Volumes III and IV, respectively*).

Volume V.—Comprises particulars of Radio time signals, Uniform time system, navigational warnings and Position fixing systems (Decca, Loran, Consul, etc.)."]

[**Page xx.**—Lines 2-5 : *Delete* " A " to " Supplements " and *substitute* :— " All corrections subsequent to the date of publication."]

[Line 10 : *Delete* " Supplements " to " the "

[**Page xxii.**—Lines 55-56 : *For* " astronomical " *read* " geographical "]

[**Page xxiii.**—Lines 3, 12 : *For* " astronomical " *read* " geographical "]

Page xxxiv.—Line 8 : *For* " wireless " *read* " radio "

Index to Admiralty Published Charts, S.D. 31, facing page 1.—In Lat. 5° 05′ N., Long. 115° 50′ E., *for* " Sipitang " *read* " *Sipitang roads 1847* "

Digitized by Google

[**Page 1.**—Lines 11-12: *For* "Netherlands" *read* "Republic of Indonesia"]
[Line 15: *For* "Netherlands" *read* "the Indonesian province of"]

[**Pages 8-11.**—*Insert* page numbers.]
[At foot of each page: *Insert* the following title of the diagram :—General Surface Current Circulation.]

[**Page 20.**—*After* line 6 *insert* :—

LIFE-SAVING.—Lifeboats and life-saving appliances form the principal means adopted for saving life.

The line-throwing apparatus, the principal life-saving appliance, can often be used with effect when a lifeboat is not available; its success, however, depends largely upon an intelligent co-operation on the part of the crew of the stranded vessel.

Signals.—In accordance with the International Convention for the Safety of Life at Sea, 1948, Chapter V, Regulation 16, the following signals shall be used by life-saving stations when communicating with ships in distress and by ships in distress when communicating with life-saving stations :—

(*a*) *Replies from shore station to distress signals made by a ship* :—

Signal	*Signification*
By day.—White smoke signal. *By night.*—*White* star rocket.	"You are seen—assistance will be given as soon as possible."

(*b*) *Landing signals for the guidance of small boats bringing away the crew of a wrecked ship* :—

Signal	*Signification*
(i) *By day.*—Vertical motion of a white flag or the arms. *By night.*—Vertical motion of a *white* light or flare. A range (indication of direction) may be given by placing a steady *white* light or flare lower and in line with the observer.	"This is the best place to land."
(ii) *By day.*—Horizontal motion of a white flag or arms extended horizontally. *By night.*—Horizontal motion of a *white* light or flare.	"Landing here highly dangerous."
(iii) *By day.*—Horizontal motion of a white flag, followed by the placing of the white flag in the ground and the carrying of another white flag in the direction to be indicated. *By night.*—Horizontal motion of a *white* light or flare, followed by the placing of the *white* light or flare on the ground and the carrying of another *white* light or flare in the direction to be indicated.	"Landing here highly dangerous. A more favourable location to land is in the direction indicated."

Digitized by Google

Page 20 continued.

(*c*) *Signals to be employed in connection with the use of shore life-saving apparatus* :—

Signal	*Signification*
(i) *By day.*—Vertical motion of a white flag or the arms. *By night.*—Vertical motion of a *white* light or flare.	*In general* :—" Affirmative." *Specifically* :— " Rocket line is held." " Tail block is made fast." " Hawser is made fast." " Man is in the breeches buoy." " Haul away."
(ii) *By day.*—Horizontal motion of a white flag or arms extended horizontally. *By night.*—Horizontal motion of a *white* light or flare.	*In general* :—" Negative." *Specifically* :— " Slack away." " Avast hauling."]

[**Page 22.**—Line 7 : *For* " Vol. II " *read* " Vol. V "]

Page 42.—Line 19 : *Delete.*

[**Page 49.**—Line 15 : *Delete* " ball "]
[Lines 23-24 : *For* " ball beacons " *read* " beacons, each surmounted by a truncated cone "]

Page 56.—Lines 8-12 : *Delete.*
Line 20 : *Delete* " **Beacons.—Buoyage.—** "
Lines 38-44 : *Delete* " ; they " to " officially "

[**Page 66.**—Line 49 : *For* " southern " *read* " northern "]
[Line 50 : *For* " northern " *read* " southern "]

Page 67.—*After* line 14 *insert* :—
Obstruction.—In 1951, an obstruction with a depth of about 8 feet (2^m4) over it, lay in the mouth of the river, [about 2 cables eastward of the entrance beacons.]

Page 71.—Line 10 : *Delete.*

Page 72.—[Line 26 : *For* " **Buoy.—** " *read* " **Buoys.—** "]
Lines 29-30 : *For* " northward ; the entrance " *read* " northward. The entrance "
Line 32 : *Delete* " in 1949 " to " (2^m4)." and *substitute* " in [1953], of about [10 feet (3^m0)] on the alignment of the leading light-beacons ; it is advisable that vessels should maintain the leading line accurately as depths on either side decrease rapidly and considerably."
Line 34 : *Delete* and *substitute* :—
" there was, in 1951, a least depth of 11½ feet (3^m5).
[A white conical buoy is moored about 1¼ miles westward of the outer entrance beacons ; a small white can buoy is moored about one mile southward of it."]
Line 46 : *After* " **Beacons.—** " *insert* " **Buoy.—** "

Digitized by Google

Page 72 continued.

[Lines 51-52 : *Delete* " , and " to " side "]

After line 53 *insert* :—

A white conical buoy, No. 3, is moored close eastward of the inner [beacon on the southern side of the channel.]

Page 73.—Line 6 : *Add* :—In 1951, this beacon had disappeared.

Line 7 : *After* " lights " *insert* " for the outer part of the approach channel "

After line 14 *insert* :—

Leading lights for the inner part of the approach channel are situated on the northern shore of the river, about 1¼ miles eastward of the rear of the two leading light-beacons referred to above : the front light is exhibited at an elevation of 15 feet (4m6) from a red tank with white stripes, 17 feet (5m2) in height : the rear light is exhibited at an elevation of 33 feet (10m1) from a red iron framework structure, 33 feet (10m1) in height ; these two lights in line bear 108½°.

A beacon, surmounted by two white triangles, points down and disposed vertically, stands on the above alignment about 2¼ cables east-south-eastward of the rear leading light-structure ; this beacon is used as an aid for outward bound vessels, to warn them that they are almost on the alignment of the leading light-structures.

After line 29 *insert* :—

Tide gauge.—A tide gauge is situated on the outer black beacon of the outer bar ; the reading " 18 decimetres " on the gauge corresponds to chart datum.

Lines 47-51 : *Delete* " keep " to " light-beacon." and *substitute* " , from a distance of at least one mile west-north-westward of the outer light-beacon, maintain the alignment of the leading lights, in line 114°, accurately until she arrives on the alignment of the inner leading light-structures bearing 108½° ; the latter alignment should be maintained until the vessel has passed the rear light-structure of the 114° alignment."

[**Page 79.**—Line 54 : *Delete* " **Lights.**— "]

Page 80.—[Lines 18-22 : *Delete.*]

Line 32 : *For* " 1,112 feet (339m0) " *read* " 1,296 feet (395m0) "

Line 44 : *Delete* " **Beacon.**— "

Lines 44-45 : *For* " **Obstruction.**— " *read* " **Obstructions.**— "

Line 47 : *For* " 214 feet (65m2) " *read* " 256 feet (78m0) "

Page 81.—Line 2 : *For* " forms " *read* " rises from Tanjong Batu,"

Lines 3-4 : *Delete* " 233 " to " 77m1) " and *substitute* " 253 feet and 272 feet (77m1 and 82m9) "

Line 5 : *For* " 391 feet (119m2) " *read* " 407 feet (124m0) "

Lines 8-9 : *Delete* and *substitute* :—

A light is exhibited on request, at an elevation of [53 feet (16m2)], from a white mast with black bands, on Tanjong Batu.

[Line 11 : *For* " three-quarters of a mile " *read* " 1¼ miles "]

Line 13 : *For* " 97 feet (29m6) " *read* " 105 feet (32m0) "

Lines 18-19 : *Delete* " 1950 " to " (2m4)." and *substitute* " 1952, was 7 feet (2m1)."

Lines 21-22 : *Delete.*

Digitized by Google

Page 81 continued.

Lines 23-24 : *Delete* " An " to " [westward] " and *substitute* :— " Two obstructions, marked by a black spherical buoy, surmounted by a white ——— cone, situated about 4 cables north-westward of them, lie [about 1½ miles west-south-westward] "

Lines 25-28 : *Delete.*

Lines 53-54 : *Delete* and *substitute* :—

Directions.—The coast should be approached outside the 6-fathom (11m0) line so as to keep clear of the numerous fish traps which exist in this vicinity. From a position about 4¾ miles west-south-westward of Tanjong Kalang Bau, the vessel should steer for that point bearing 086°, on which bearing Tanjong Parakan, on the southern side of the river, will be obscured. Having passed southward of the fish trap marked by a small mast on its head, charted about 2¾ miles westward of Tanjong Kalang Bau, the vessel should steer 090° for the black spherical buoy and pass northward of it. Thence the vessel should steer 097° for the anchorage in the mouth of the river ; by so doing, the vessel will pass about one cable southward of one of the obstructions referred to above, and about three-quarters of a cable northward of the northern spur of a fish trap charted 1¼ cables west-south-westward of Tanjong Kalang Bau.

Page 82.—Lines 2-5 : *Delete.*

[Lines 17, 48 : *For* " Se Batu " *read* " Sebatuan "]

Line 21 : *After* " channel " *insert* " ; the wreck dries about 3 feet (0m9) and is marked by a beacon which, however, covers at high water[. In 1953, there was a 5-foot (1m5) shoal about a quarter of a cable south-eastward of the wreck] "

Line 23 : *Add* :—[Two notice boards bearing navigational instructions are placed about 2½ cables south-westward and half a cable southward of the wreck.]

A [rectangular] warning board giving notice of the existence of rocks, inscribed " STENEN," stands on the eastern bank of the river nearly half a cable eastward of the wreck.

Line 29 : *Add* :—It is advisable not to pass the wreck at the time of highest high water, as at other times the wreck or its beacon is visible.

Line 43 : *For* " 6¾ " *read* " 1¾ "

Line 44 : *Add* :—A wooden bridge crosses Sungei Subah, about one mile above Sambas bridge, and a concrete bridge crosses Sungei Asam, about 8½ cables above Sambas bridge.

Page 83.—Line 5 : *For* " 113 feet (34m4) " *read* " 180 feet (54m9) "

[Line 37 : *For* " 1¼ miles " *read* " three-quarters of a mile "]

Page 86.—Line 8 : *Delete.*

Page 87.—Line 43 : *For* " *1822, 1746* " *read* " *1746, 2106* "

Page 88.—Line 1 : *For* " *1822, 1746* " *read* " *1746, 2106* "

[Lines 10-11 : *For* " 240 feet (73m1) " *read* " 275 feet (83m8) "]

[*After* line 17 *insert* :—

Fog.—Dense early morning fog over the river is prevalent, especially after heavy rain during the previous night ; normally the fog is dispersed by 2 or 2½ hours after sunrise.]

Digitized by Google

Page 88 continued.

After line 43 *insert* :—

Chart 1822.

[Line 52 : *Delete* " **Buoy.**— "]

[**Page 89.**—Lines 24-25 : *Delete* " ; a red " to " rock "]

[Lines 43-44 : *Delete* " the buoy marking "]

Page 90.—Line 10 : *For* " 490 feet (149^{m}3) " *read* " 430 feet (131^{m}1) "

Line 11 : *For* " 50 feet (15^{m}2) " *read* " 60 feet (18^{m}3) "

[**Page 91.**—Line 8 : *Delete* " and " to " buoy "]

[Line 41 : *Add.*—In 1952, the beacons were very difficult to distinguish unless in direct sunshine, as the trees on each side of the clearing overtopped them ; at that time the beacons were unpainted wooden spars, the front surmounted by a white triangle and the rear by a white ball.]

[**Page 93.**—Line 18 : *Delete* " " steer " to " river " " and *substitute* " " Centre " "]

[Lines 32-34 : *Delete* " A small " to " Pending."]

[Line 35 : *For* " Provisions are scarce " *read* " Tinned provisions are plentiful "]

Page 94.—Line 4 : *Delete* " 4 " to " 10 " and *substitute* " 3 fathoms (5^{m}5) over it, extending from 4½ to 9 "

Page 95.—Line 47 : *For* " Marow " *read* " Marou "

Lines 49-53 : *Delete* and *substitute* :—

" Blas, a sandbank with a least depth of one foot (0^{m}3) over it, situated about 7 miles north-westward of Tanjong Batang Marou, and Beting Maro, a sandbank which dries 2 feet (0^{m}6), situated about 4½ miles north-north-westward of the same point. A bank, with a depth of 2 feet (0^{m}6) over it, lies about midway between the two beforementioned sandbanks."

Page 96.—Line 2 : *For* " Marow " *read* " Marou "

[Lines 4-5 : *Delete* " 70 " to " seaward." and *substitute* " 53 feet (16^{m}2), from a white wooden tower on Tanjong Selalang."]

Line 5 : ———————————————————

[Line 9 : *For* " **Light.**— " *read* " **Lights.**— "]

[*After* line 34 *insert* :—

A light is exhibited, at an elevation of 21 feet (6^{m}4), from a white wooden beacon surmounted by a daymark, about 4 cables north-north-eastward of Tanjong Jarijeh.]

Page 97.—Line 2 : *Delete* " As " and *substitute* " Between Rajang and the anchorage at Tanjong Mani, about 10 miles farther up-stream, salient features of the river banks are marked by beacons and notice-boards, but as "

Line 28 : *Delete* " 11 " to " 4 " and *substitute* " 13 feet (4^{m}0), is situated about 3 "

Digitized by Google

Page 97 continued.

Lines 41-43 : *Delete* and *substitute* :—

A light is exhibited, at an elevation of 125 feet (38^{m}1), from a steel framework tower 120 feet (36^{m}6) in height, close off Tanjong Sirik.

Page 98.—[Line 41 : *For* " Tanjong Tatau, 49 " *read* " Batang Tatau, 45 "]

[Line 44 : *Add* :—In 1951, it was reported that Batang Tatau was navigable as far as Tatau by vessels up to 150 feet (45^{m}7) in length and 8 feet (2^{m}4) draught, provided they could cross the bar.]

Line 46 : [*For* " Tanjong Tatau " *read* " Batang Tatau "]

[Line 47 : *For* " 15 " *read* " 19 "]

[Lines 51-52 : *Delete* " a prominent " to " Bintulu." and *substitute* " 2,066 feet (629^{m}7) high, and Bukit Setiam, 2,095 feet (638^{m}5) high, situated, respectively, about 17 and 14 miles south-south-westward of Bintulu. Bukit Setiam has an easily identifiable summit and is a useful navigational mark."]

After line 52 *insert* :—

[Landing along the whole stretch of this coast is very difficult.]

Page 99.—Line 12 : *For* " **Bantang Kemena.—Lights.**— " *read* " **Kuala Bintulu.—Beacons.** "

Line 13 : *For* " Batang Kemena " *read* " Kuala Bintulu "

Lines 14-16 : *Delete* " two " to " 138°." and *substitute* " a pair of leading beacons which, in 1951, were in line bearing 125½°, but the positions of these beacons are altered to meet changes on the bar."

[Lines 49-54 : *Delete* and *substitute* :—

Coast.—General.—Between Tanjong Kidurong and Tanjong Batu, about 68 miles north-eastward, the coast is low and featureless ; Gunong Subis, 1,355 feet (413^{m}0) high, which lies about 20 miles southward of Tanjong Batu, is the only natural feature which is readily identifiable. The coast is flanked by a series of gently rising ridges which gradually diverge from the shoreline towards Gunong Subis, whence they trend towards the coast until within the vicinity of Tanjong Batu. These ridges rise to an elevation of about 1,000 feet (304^{m}8) in places, but it is extremely difficult to identify individual summits.

A number of rivers discharge into the sea along this stretch of coast, the most important being Suai, Niah and Sibuti rivers about 26, 10 and 8 miles, respectively, south-westward, of Tanjong Batu. Any craft which can cross the bars can navigate the rivers without much difficulty, and they are extensively used for trade and communication by small coastal craft with local knowledge. The entrances to these rivers are very difficult to discern from seaward, the leading marks over the bars being, in most cases, the only indication of their positions. All have shallow bars, and the best crossing is usually indicated by stakes or leading marks, or both. In some cases lights are exhibited from the leading marks when vessels are expected. The depths and channels over the bars are constantly changing, and entry should not be attempted without local knowledge.

Digitized by Google

Page 99 continued.

On the out-going tidal stream, and particularly after heavy rain, a surface layer of river water extends a considerable distance seaward from the rivers. Much debris is brought down, including " floating islands " of Nipa palm, and very large logs which are often practically submerged and constitute a danger to navigation. These may be encountered at any distance off-shore. Off Niah and Sibuti rivers the line of discoloured river water was encountered ten miles seaward in July, 1951. Patches of discoloured water often give the impression of shallow water, and, by contrast, there is rarely any visual indication of the off-lying shoals until the vessel is right over them. After heavy weather, sand in suspension is found all along the coast up to a considerable distance offshore, and this again gives the impression of shallow water.

Administration.—Communication.—The area between Batang Tatau and Tanjong Batu is under the administration of the Resident, Fourth Division, who is stationed at Miri. There is a District Officer at Bintulu and Native Officers at Tatau, Niah and Sibuti.

There are no roads, all communication with the interior being by river. The country is densely wooded, the trees extending right down to the high water line in most places.

Anchorage.—The general nature of the bottom is soft grey mud and sand ; the shoals are rocky outcrops covered with coral and sand. The holding ground is generally good and a vessel can anchor anywhere along the coast provided the charted shoals are avoided. There is no shelter from an offshore wind except for very small vessels in Telok Plan.

Current.—In September 1951, at a distance of 35 miles north-westward of Tanjong Kidurong, a current set in a south-westerly direction with a maximum rate of 0·3 knots. In June 1951 a similar current prevailed 6 miles north-westward of Kuala Similajau.

Coast.—Dangers.—Beacons.—From Tanjong Kidurong to Tanjong Sedanai, about 14 miles north-eastward, the coast is broken, with rocky outcrops and sandstone cliffs alternating with sandy beaches. None of the cliffs is very remarkable. There are several small rivers, the largest being Sungei Likau, about 8 miles north-eastward of Tanjong Kidurong. Tanjong Sewai, Tanjong Likau and Tanjong Patok are situated about 5, 8 and 10 miles north-eastward of Tanjong Kidurong ; none of these is remarkable from seaward.

Likau rocks, one foot (0^{m}3) high, lie about 1½ miles west-north-westward of Tanjong Likau ; they are in three parts and extend nearly half a mile, parallel to the coast. Several shoal patches exist between Likau Rocks and Tanjong Likau. A shoal, with a depth of 10 feet (3^{m}0) over it, lies about 2½ miles west-south-westward of Tanjong Likau, and there are several 4- and 5-fathom (7^{m}3 and 9^{m}1) patches extending a further 2 miles westward from this shoal.

There are numerous off-lying rocks and reefs along this stretch of the coast which extend as much as 3 cables offshore ; their positions are best seen on the chart.]

Page 100.—[Lines 2-7 : *Delete* " is " to " Lobang " and *substitute* :—

" From Tanjong Sedanai the coast trends north-eastward in a slight curve for about 7 miles to Kuala Similajau. It is low and

Digitized by Google

Page 100 continued.

featureless, flanked by gently rising ridges of hills, none of which is remarkable. For about 3 miles it is fringed with rocky ledges and backed by low cliffs for the first mile ; thereafter it consists mainly of a long sandy beach backed by casuarinas.

A white beacon, 30 feet (9m1) in height and surmounted by a **T**, stands on Farr bluff the northern entrance point of Kadri cove situated close north-eastward of Tanjong Sedanai.

Batu Semebah, a group of rocks which dry 4 feet (1m2), lie about 3 miles north-eastward of Tanjong Sedanai and about 3 cables offshore ; two rocks, which dry 3 feet (0m9), are situated about 2 miles further north-eastward, near Sungei Panapa. There are numerous small streams running into the sea, the largest of which are Sungei Sabulong and Sungei Semebah.

A white beacon, with a circular topmark, 59 feet (18m0) high, stands about 3 cables northward of the entrance to Sungei Semebah situated about 4 miles south-westward of Kuala Similajau.

A white beacon, with a triangular topmark, 58 feet (17m7) high, stands on Stag point, the southern entrance point to Kuala Similajau.

From Kuala Similajau the coast trends about one mile north-northwestward to Tanjong Similajau which is fringed by rocky ledges to a distance of about a quarter of a mile.

A white beacon surmounted by a diamond, 107 feet (32m7) high, stands on Tanjong Similajau.

About 4 cables northward of Kuala Similajau a rocky ledge extends about 2 cables offshore ; White rock, which dries 3 feet (0m9), lies close south-westward of this ledge and constitutes the chief danger when entering the river.

Basket rock and Horn rock, with depths of less than 6 feet (1m8) over them and on which the sea sometimes breaks, lie, respectively, about 11 and 16 cables south-westward of Tanjong Similajau ; a detached 13-foot (4m3) patch lies about 4 cables north-north-westward of Basket rock.

James reef, Mark reef and Jonah shoal, with least depths of 3, 2¾ and 3½ fathoms (5m5, 5m0 and 6m4) over them, respectively, lie nearly 2 miles off Tanjong Similajau and between one and 2 miles north-westward of Basket and Horn rocks.

Foul ground, with many sunken rocks, lies within a radius of 6 cables of Tanjong Similajau ; a rocky shoal, with a least depth of 11 feet (3m4) over it, lies between 6½ and 9 cables north-westward of the point, and a detached rocky 13-foot (4m3) patch lies about 2½ cables northward of the 11-foot (3m4) shoal. All these dangers are named Inner shoals.

Kuala Similajau.—Beacons.—Lights.—There is a bar consisting of hard sand over rock, with a depth of less than one foot (0m3) over it, at the entrance to Kuala Similajau. The channel over the bar is marked by two pairs of beacons, from which lights are occasionally exhibited when vessels are expected or leaving. The outer pair have white square topmarks, and are in line bearing 089½° ; the inner pair have white triangular topmarks and are in line bearing 139°. The outer pair of beacons also mark the best approach to the anchorage for large vessels.

A timber camp is situated about half a mile up the river. There

Digitized by Google

Page 100 continued.

is a small wooden jetty, with a depth of 12 feet (3m7) alongside, on the left bank of the river below the timber camp.

Anchorage.—Anchorage may be found, off Kuala Similajau, outside the 5-fathom (9m1) line, anywhere southward of the outer leading line described above. The bottom consists of soft grey mud and is good holding ground.

Directions.—Vessels approaching Kuala Similajau should keep outside the 10-fathom (18m3) line until due west of Kuala Similajau when they should steer for the mouth of the river and bring the outer leading beacons into line, bearing 089½°; these beacons, in line, lead clear of all dangers. If entering the river the outer leading beacons should be kept bearing 089½° until the inner leading beacons are in line, bearing 139°, these beacons in line lead into the deep water in the river.

Sungei Similajau.—Dangers.—Sungei Similajau is navigable by craft which can cross Kuala Similajau bar, as far as the fork situated about 4 miles upstream above which it is only suitable for boats. A reef, which dries in places, extends about two-thirds of the way across the river at a small backwater about 1½ miles upstream. A rock, with a depth of less than 6 feet (1m8) over it, lies close to the western bank at a sharp bend about 7 cables downstream from the fork.

Logs are sometimes found with one end stuck firmly in the river bed, while from about 2 miles upstream numerous tree trunks project from the banks, some being under water.

The nature of the bottom is mostly rock, and in the lower reaches mud over rock.

After heavy rains the rate of the out-going tidal stream at the entrance may increase from a normal maximum of 2 knots to as much as 4 knots.

Coast.—Dangers.—From Tanjong Similajau the coast trends about 2 miles north-eastward to Wiser Bay and consists mainly of flat rocky ledges extending up to 2 cables offshore with sandy beaches in between and backed by low sandstone cliffs.

Wiser bay is a shallow bight about one mile wide with a sandy beach; an isolated rock is situated about 2 cables offshore in the middle of the bay.

From Wiser Bay to Tanjong Bregum about 4½ miles north-eastward the coast is broken, rocky ledges backed by low cliffs alternating with sandy, tree-fringed beaches. These ledges extend from 2 to 3 cables offshore in some places. Hills rise to a height of about 490 feet (149m3) within 2 miles of the coast.

From Tanjong Bregum to Tanjong Payong about 7 miles north-eastward the beach is sand with mud at, or close to, the low water line. The beach is fringed with casuarinas and the land behind is low, so that only the coastal belt of trees is seen from seaward. There are many small rivers of which only Sungei Nyalau is of importance. This river enters the sea about 6 miles south-westward of Tanjong Payong. It is navigable, by craft which can cross the bar, for several miles. The channel over the bar, which dries, is marked by stakes. There is a small village on the southern bank, near the entrance to the river.

Digitized by Google

Page 100 continued.

Tanjong Payong, the most north-westerly point between Tanjong Kidurong and Tanjong Batu, is low, and consists of rocky outcrops and ledges with fringing reefs. A rock which dries 4 feet (1m2), lies about 1½ miles north-eastward of Tanjong Payong and about 4 cables offshore.

From Tanjong Payong to Tanjong Batu the coast is low and featureless. A sandy beach extends the whole way and the trees fringing this are mostly casuarinas. Gunong Subis, 1,355 feet (413m0) high, lies about 22 miles east-north-eastward of Tanjong Payong ; it is most conspicuous, and can be seen from a great distance offshore. It is easily recognisable by the whitish patches of limestone on its seaward side.

Numerous rivers flow into the sea on this stretch of coast, but the only ones of importance are Batang Suai, Batang Niah and Sungei Sibuti.

Kuala Suai, the mouth of Batang Suai, is situated about 6 miles north-eastward of Tanjong Payong. The river is entered over a bar with a depth of about 2 feet (0m6) over it. The best course over the bar is indicated by leading marks on the south bank. These, when in line, bore 117°, in 1951, but the bar changes frequently and the leading marks are moved accordingly. The river is navigable by vessels of 60 feet (18m3) in length and drawing 5 feet (1m5), as far as Suai, about 13 miles upstream. A fairly extensive area has been cleared on both banks near the entrance to the river, and there is some cultivation and a number of native dwellings. There is a sawmill on the north bank about half a mile from the entrance and logging companies operate up the river.

Batang Niah enters the sea about 16 miles north-eastward of Kuala Suai. The river runs in a south-easterly direction and skirts the Subis hills. It is entered over a bar which has a depth of about one foot (0m3) over it. In 1951, leading beacons, in line bearing 085°, led over the bar but did not indicate the best water, the navigable channel being marked by stakes. A sand spit, covered at high water, extends from the south bank into the river at the entrance; its extremity is marked by a stake. From the entrance, the river runs parallel to the beach for about one mile, forming a narrow strip of land which is sparsely inhabited. The main kampong is about a quarter of a mile inside the entrance. The river is navigable by vessels of 60 feet (18m3) in length and drawing 6 feet (1m8) as far as Subis. Niah lies about 7 miles upstream from the entrance.

The entrance to Sungei Sibuti lies about 2 miles north-eastward of that of Batang Niah. The river runs parallel to the coast for some 6 miles to Sibuti, when it diverges and eventually turns south-eastward. It is entered over a bar which almost dries. The channel over the bar was well marked, in 1951, by leading beacons, in line bearing 099°, and by stakes. There is a small kampong on the south bank close inside the entrance. The river is reported to be navigable by vessels 60 feet (18m3) in length and drawing 5 feet (1m5) for about 15 miles from the entrance.

There are clumps of very high casuarina trees immediately northward of the entrances to Batang Niah and Sungei Sibuti, which are a guide to the positions of the river mouths.

Digitized by Google

Page 100 continued.

Tanjong Batu lies about 8 miles north-eastward of the entrance to Sungei Sibuti. Here whitish limestone cliffs extend for about 4 miles along the coast, and rise to an elevation of 80 feet (24m4) in places; they show up well from seaward when the sun is on them, but there are no conspicuous points suitable for fixing. The beach below is strewn with large boulders, and submerged rocks and drying reefs extend up to 4 cables offshore. The land above the cliffs rises steeply, and forms a series of hills which gradually rise and extend north-eastward towards Lambir hills.

Trade.—There is a brisk trade in Sibuti, Niah, Suai, Kemena and Tatau rivers. Timber companies operate on Suai, Similajau, Kemena and Tatau rivers, and other jungle products, e.g., jelutong, rubber and belian ataps are worked on all of them. Little fishing is carried out along this stretch of the coast; it is done from boats and with moored traps; there are no fish stakes.

Coast.—Light.—Tanjong Lobang "]

[Line 11: *After* " steel " *insert* " framework "]

[Line 12: *Delete* " In " to " extinguished." and *substitute* :—It is unreliable.]

After line 14 *insert*:—

Line 19: *Delete* " **Off-lying dangers.—Buoy.—** "

Line 20: *Delete* " marked " to " buoy,"

[Lines 37 to 43: *Delete* and *substitute* :—

Charts 2107, 2660b.

Acis shoals, discovered by H.M.S. *Acis* in 1860, consist of North shoal, having a depth of 8¾ fathoms (16m0) over it, which lies about 40 miles north-westward of Tanjong Kidurong, and South shoal, a ridge of coral, running for about 5½ miles in a north-easterly and south-westerly direction, situated about 7 miles south-eastward of North shoal. The least depth over this ridge is 6¼ fathoms (11m4), near the south-western end. A detached shoal, having a depth of 8½ fathoms (15m5) over it, lies about 2 miles south-south-eastward of the southern end of South shoal.

Charts 2108, 2660b.

Marie shoal, having a least depth of 6¾ fathoms (12m3), lies about 29 miles north-westward of Tanjong Kidurong.

Patricia shoal, with a depth of 5 fathoms (9m1) over it, lies about 22 miles northward of Tanjong Kidurong.

Ruth shoals, which consist of four separate coral patches, lie about 9 miles north-westward of Patricia shoal. The least water lies over the easternmost patch, which has a depth of 5¾ fathoms (10m5) over it.

Isobel shoals, which consist of a coral ridge running in a north-easterly and south-westerly direction, having a least depth of 6¾ fathoms (12m3) over it, and a shoal with a depth of 6 fathoms (11m0) over it, lie about 10 and 15 miles, respectively, north-westward of Ruth shoals.

Chart 2108.

Wilson shoal lies about 20 miles north-westward of Tanjong Similajau; it has a depth of 8¼ fathoms (15m1) over it.

Christine shoals, situated about 4 miles north-westward of Wilson shoal, consist of two separate patches of coral which have depths of 9¼ and 5¾ fathoms (16m9 and 10m5) over them.

Digitized by Google

Page 100 continued.

Madalene shoals, a large group of detached coral patches, extend from about 4½ miles westward to 9 miles north-westward of the northern part of Christine shoals. The shoalest part is at the extreme southern end where a depth of 5¾ fathoms (10m5) exists. Elsewhere there are depths of from 7½ to 9 fathoms (13m7 to 16m5).

Cochrane bank, having general depths of from 8½ to 10 fathoms (15m5 to 18m3) over it, lies about 11 miles north-westward of Tanjong Payong, and extends for about 10 miles in a south-westerly and north-easterly direction.

Elizabeth shoals, situated about 6 miles north-westward of Cochrane bank, consist of a group of 4 coral patches. The least depth over them is 5¼ fathoms (9m6).

Kennett bank lies about 14 miles northward of Tanjong Payong, and has a depth of 12 fathoms (21m9) over it.

Ursula shoals, a group of three shoals, with depths of 2, 4¾ and 5¾ fathoms (3m7, 8m7 and 10m5) over them, are situated about 14 miles north-eastward of Tanjong Payong and about 7 miles offshore; the north-eastern and shoalest is very steep-to and should be given a wide berth.

With the exception of Cochrane bank and Kennet bank, where the nature of the bottom is mud and sand, probably over rock, all the above shoals are rocky outcrops covered with sand and coral.]

[**Page 101.**—Line 43: *Delete* " from 4 " to " high " and *substitute* " 3 feet (0m9) high "]

Page 102.—Line 25: *After* " are " *insert* " a tree standing on high ground about one mile east-north-eastward of Tanjong Lobang light-structure; "

[Line 34: *For* " Two " *read* " Three "]

Lines 44-45: *Delete* " 96 " to " height " and *substitute* " 80 feet (24m4) from a grey steel framework structure "

Line 48: *For* " **buoys** " *read* " **buoy** "

Line 54: *After* " of a " *insert* " black can-shaped "

Page 103.—Line 2: *For* " 2 miles westward " *read* " 2½ miles west-north-westward "

Lines 6-9: *Delete.*

[Line 35: *Add*:—There is a pier about 2 cables in length, with a depth of 3½ feet (1m1) at its head, about 3½ cables northward of the northern entrance point to Sungei Miri.]

[**Page 104.**—*After* line 6 *insert*:—

Vessels arriving with immigrants anchor about 3¼ miles north-north-westward of Tanjong Lobang and about 2 miles offshore.]

[Line 24: *After* " **Anchorage.**— " *insert* " **Mooring buoys.**— "]

[Line 27: *Add*:—There are four mooring buoys, Nos. 1 to 4, in the western part of the prohibited area.]

[Line 38: *For* " white " *read* " grey "]

[Line 39: *Add*:—The light-structure is difficult to distinguish from northward and westward unless the sun is shining on it.]

Page 106.—Line 26: *Delete.*

Digitized by Google

[**Page 107.**—Line 15 : *After* " night " *insert* " ; in 1952, this glow was seen from a distance of 50 miles "]
[*After* line 28 *insert* :—
Prohibited area.—Entry is prohibited into an area, indicated on the chart by pecked lines, which extends about 2 miles offshore over a distance of 8 miles in the vicinity of Seria.]

[**Page 108.**—Lines 19-20 : *Delete* " ; it can " to " side "]
[Line 26 : *For* " situated " *read* " is situated "]
[Line 27 : *For* " , is conspicuous " *read* " ; on it there is a conspicuous solitary tree "]
[Line 48 : *Delete* " **Buoy.**— "]

[**Page 109.**—Lines 29-31 : *Delete* " A " to " head."]

[**Page 110.**—Lines 9-10 ; *Delete* " , and is conspicuous "]
[Line 15 : *Delete* " 292 " to " high " and *substitute* " 185 feet (56m4) high to the tops of the trees "]

[**Page 111.**—Line 32 : *For* " **Buoyage.**— " *read* " **Light-buoy.**— **Light.**— "]
[Line 39 : *Delete* " pillar " to " white " and *substitute* " light-buoy, painted in red and white chequers "]
[*After* line 49 *insert* :—
A light is exhibited, at an elevation of 52 feet (15m8), from a white framework structure, 11 feet (3m4) in height, on the southern summit of Pelong rocks.]
[Lines 52-54 : *Delete* " ; a red " to " drift "]

[**Page 112.**—Lines 23-24 : *Delete* " between " to " rock and " and *substitute* " southward of "]

Page 113.—Line 46 : *Delete.*

Page 114.—Line 43 : *Delete* " **Dangers.**" to " **Buoys** " and *substitute* " **Limits.—Dangers.—Beacons.**"

Page 115.—Line 2 : *For* " black beacon " *read* " white beacon, with red bands,"
Lines 3-4 : *Delete* " It " to " buoy."
Line 17 : *For* " rectangle " *read* " yellow sphere "
Lines 24-25 : *Delete.*
Line 26 : *Delete* " **Directions.**— "
Lines 35-39 : *Delete* and *substitute* :—
Explosives and quarantine anchorages.—The explosives anchorage is indicated by pecked lines on the chart, south-eastward of Harbour shoal.
The quarantine anchorage, also indicated on the chart, lies eastward of the explosives anchorage, between it and the eastern limit of the harbour (*see* page 114).
Prohibited anchorage.—Anchorage is prohibited in the north-western part of the harbour, north-westward of a line, indicated on the chart, drawn in a south-westerly direction from No. 3 beacon, situated 4½ cables westward of Ramsey point.

Digitized by Google

Page 115 continued.

Line 41 : *For* " A vessel " *read* " **Directions.**—A vessel "
Lines 49-51 : *Delete.*

Page 116.—Lines 2-4 : *Delete* " There " to " these " and *substitute* " Victoria wharf, with a depth of about 14 feet (4m3) alongside, lies at the north-western end of the harbour ; south-eastward of it "
[Lines 5-9 : *Delete* " Liberty " to " vicinity." and *substitute* " an L-shaped wharf, with a 400-foot (121m9) face and with mooring dolphins 100 feet (30m5) beyond each end, which was under construction in 1954."]
[Line 29 : *After* " **Beacons.**— " *insert* " **Light-buoy.**— "]

Page 117.—*After* line 32 *insert* :—
[A conical light-buoy, painted in black and white chequers, and exhibiting a *white flashing* light *every second*, moored about 3¼ miles northward of Bukit Sari, marks the outer end of the channel across the flats leading to Batang Lawas. Vessels should pass north-westward of the light-buoy.]
Chart 1847.
Lines 38-39 : *For* " 2¼, 4½ and 6 " *read* " 1¾, 4½ and 5¾ "
After line 39 *insert* :—
Between Sungei Sinulop, about 3½ cables eastward of Tanjong Marantongan, and Sungei Sebuboh, about 2¼ miles north-eastward the coast rises fairly steeply to a narrow ridge on which there are numerous peaks, the highest of these attaining an elevation of 410 feet (125m0) in Bukit Sebuboh near the centre of the ridge. Farther northward, a similar but lower coastal ridge lies between Tanjong Sebuboh and Tanjong Marintaman, attaining an elevation of 270 feet (82m3) near its centre.
Lines 41-42 : *Delete* " Passage " to " foul and " and *substitute* " Numerous rocky patches, the shoalest of which has a least depth of 8 feet (2m4), lie between Takat besar and the coast ; for their positions the chart is the best guide. Passage between these rocks and the coast is possible but as the dangers are not marked it "
Line 47 : *After* " name " *insert* " ; the river is crossed by a bridge a short distance within the entrance "
After line 48 *insert* :—
A reef, which dries 8 feet (2m4), lies on the southern side of the entrance to the boat channel, about 1½ cables westward of the flagstaff situated on the southern entrance point of the river.
After line 52 *insert* :—
Chart 1844.

[**Page 118.**—Line 41 : *After* " **Beacon.**— " *insert* " **Light.**— "]
[Line 48 : *For* " 1946 " and " 24 feet (7m3) " *read* " 1952 " and " 22 feet (6m7) "]
[Line 49 : *For* " 17 " and " 5m2 " *read* " 14 " and " 4m3 "]

[**Page 119.**—Lines 2-3 : *For* " 23 feet (7m0) " *read* " 21 feet (6m4) "]
[*After* line 7 *insert* :—
A light is exhibited, at an elevation of 80 feet (24m4), from an aluminium-coloured steel framework tower, 73 feet (22m3) in height, on Sapo point.]

Digitized by Google

Page 119 continued.

[Lines 39, 42 : *For* " 24° 30′ " *read* " 25° 00′ "]
[Line 41 : *For* " 23° 30′ " *read* " 24° 30′ "]

Page 126.—Line 13 : *Delete.*

Page 127.—*After* line 17 *insert* :—

Hankin shoal, of coral and sand, lies about [4½] miles eastward of Vernon bank ; the shoal is about 5 cables in extent and has a least depth of 5½ fathoms (10m1) over it.

[*After* line 29 *insert* :—

Between Gordon patches and Fury rocks, about 14 miles west-north-westward, there are many detached shoals and patches, with depths of from 4¾ to 10 fathoms (8m7 to 18m3) over them, whose positions may best be seen on the chart ; of these Scott patches, with a least depth of 6¾ fathoms (12m3), lie about 5¼ miles north-westward of the shoalest part of Gordon patches.]

[Line 44 : *For* " two " *read* " several "]

[Line 46 : *After* " Nosang ; " *insert* " at the southern end, a shoal, with a least depth of 5½ fathoms (10m1), lies about 1½ miles southward of the northern shoal head, with two 6-fathom (11m0) patches in between ; "]

Line 47 : *Delete* " 8 " to " 14m6) " and *substitute* " 9 fathoms (11m9 to 16m5) "

Line 49 : *For* " A shoal " *read* " Paisley shoal "

Page 128.—[Lines 5-6 : *Delete* " Two " to " 3¼ " and *substitute* :— " Price shoals, with depths of 5 and 4½ fathoms (9m1 and 8m2) over them, lie about 3¼ and 4 "]

Lines 32-34 : *Delete* " covered " to " trees." and *substitute* " very heavily wooded, except for its south-eastern peak which, in 1950, bore signs of recent volcanic disturbance."

After line 36 *insert* :—

Coleman shoal, with a depth of 5¼ fathoms (9m6) over it, [lies] 2¾ miles north-westward ——— of the north-western extremity of Pulau Tega.

Page 129.—Lines 5-13 : *Delete* and *substitute* :—

Hayter shoal, [with a least depth of 4¼ fathoms (7m8) over it,] the south-eastern extremity of Dampier shoals, lies about 8 miles westward of the northern part of Deluar shoals ; they are described on page 139.

[**Page 134.**—Line 45 : *For* " **Lights.**— " *read* " **Light.**— "]
[Line 54 : *Add* :—In 1952, this beacon was in ruins.]

Page 135.—*After* line 34 *insert* :—

A coral shoal, with a least depth of 14 feet (4m3) over it, lies about 1¾ cables [southward] of Harris Reef beacon.

[Lines 42-47 : *Delete* and *substitute* :—

Two shoals with depths of] 9 and [15] feet (2m7 and [4m6]) over them, lie close together [about 1½ cables west-north-westward of the south-western corner of the pier.]

Digitized by Google

Page 135 continued.

[Line 51 : *Delete* " light-structure "]
[Line 53 : *Delete* " pier " to " days " and *substitute* " pier ; "]

[**Page 136.**—Line 48 : *For* " 280 feet (85m3) " *read* " 272 feet (82m9) "]

Page 138.—Line 20 : *Delete* " **Beacon.**— "
Lines 50-52 : *Delete* " An iron " to " bank."

Page 139.—Lines 2-7 : *Delete* and *substitute* :—
Dampier shoals[, with depths of from 3½ to 10 fathoms (6m4 to 18m3) over them,] extend in a south-easterly direction from Saracen bank for about 18 miles and terminate in Hayter shoal (*Lat. 5° 54′ N., Long. 115° 34′ E.*). Passage through these waters should not be attempted except during daylight in fine weather, in which conditions the shoals are usually visible ; soundings give very little warning of approach to these shoals.
Line 14 : *Add* :—The charted position of this bank is doubtful.

[**Page 148.**—Lines 28-30 : *Delete.*]
[Line 34 : *After* " from a " *insert* " conspicuous "]
[Line 53 : *Add* :—A beacon stands on Datum rock.]

[**Page 149.**—Lines 51-52 : *Delete* " The mast " to " Bornugus."]

Page 150.—Line 20 : *Delete.*
Lines 29-30 : *Delete* " In 1941 " to " trees."

[**Page 151.**—Line 3 : *For* " 3¾ fathoms (6m9) " *read* " 2¾ fathoms (5m0) "]
[Lines 4-6 : *Delete* " In " to " lighthouse."]

[**Page 153.**—Lines 22-23 : *Delete* " A tree " to " landmark."]

Page 163.—Line 53 : *Add* :—In 1951, a shoal with a depth of 9 feet (2m7) over it, was reported to exist about 12 cables south-eastward of Tide-pole island.

Page 168.—Line 37 : *Delete.*

[**Page 182.**—Lines 49-50 : *Delete* " with " to " on it,"]

[**Page 195.**—Line 16 : *Delete* " with a depth " to " head " and *substitute* " the outer end of which, in 1954, was in ruins "]

[**Page 196.**—Line 37 : *Delete* " depth " to " (10m4) " and *substitute* " rock, awash "]

Page 197.—Line 6 : *Delete.*
[Lines 10-11 : *For* " caution on page 22 " *read* " cautions on pages 14 and 22 "]

Digitized by Google

[**Page 200.**—Lines 29-30 : *Delete* and *substitute* :—

Directions.—Attention is again drawn to page 14 and the caution thereon, and to the caution on page 197.

From abreast Tanjong Baram the recommended track indicated on charts 2660b and 967 should be followed. The narrowest and most dangerous part of Palawan passage lies abreast Royal Captain shoal, where it is only 28 miles wide between dangers.

With a southerly wind and clear weather Balabac island may be closed if necessary to obtain a fix, but should not be approached within a distance of 12 miles on account of off-lying shoal patches.

With the wind from westward with thick cloudy weather, Balabac island should not be approached within 30 miles ; with such winds there is usually a strong easterly set through the straits. Off the south-western end of Balabac island it is not unusual, about September and October, for the wind, especially in squalls, to veer to west-north-west, or sometimes north-west, blowing with violence. Under these conditions it is prudent to pass Royal Captain shoal in daylight.

If uncertain of the vessel's position, the safest part of the edge of the 100-fathom (182^{m}9) bank on which to obtain soundings lies north-westward of Balabac island, northward of Lat. 8° 05′ N. and southward of Lat. 8° 30′ N., with Balabac peak between the bearings of 120° and 160°. Experience shows that even in the thickest weather the land is seldom totally obscured for any length of time, but generally presents a well defined outline between the squalls. When soundings are obtained on the edge of the bank the vessel should haul off north-westward, give the edge a berth of about 10 miles and then steer a mid-channel course until past Bombay shoal, whence a course parallel to the bank and from 8 to 12 miles off it may be steered. *See* " Ocean Passages for the World ".]

[**Page 203.**—Lines 46-49 : *Delete.*]

[**Page 204.**—Line 34 : *After* " island." *insert* :—There is a wooden pier, with a depth of 16 feet (4^{m}9) at its head, on the eastern side of the southern end of Calumbuyan island.]

[**Page 205.**—Line 53 : *After* " point " *insert* " ; a tower stands near the northern end of the island "]

Page 206.—[Line 40 : *After* " entrance " *insert* " ; there is a wooden pier close eastward of this point "]

After line 41 *insert* :—

The north-western end of Busuanga is locally known as Calauit island, being separated from the mainland by the Ditipac river which traverses the narrow neck of land which here connects them. This river empties into the head of Illultuk bay on the western side of Busuanga, and also into Calauit bay on the eastern side of the island. Power launches. drawing not more than 3 feet (0^{m}9), use the river as a short route when rounding the northern end of Busuanga, but care must be taken to arrive at its eastern end when there is more than half tide on the flats at Calauit.

A settlement is situated on the northern shore of Calauit bay.

Lines 48-49 : *Delete* " shoal " to " it." and *substitute* " rock awash."

Digitized by Google

Page 213.—Line 6-7 : *Delete* " ; it " to " church "
Line 9 : *For* " church " *read* " town "
Line 13 : *For* " church, bearing " *read* " town, bearing about "
After line 25 *insert* :—
There is a wharf at Port Tilig which in 1951, had a least depth of 16 feet (4m9) at its head.

[**Page 214.**—Line 6 : *After* " reef " *insert* " ; there is a small wooden jetty here, of flimsy construction, where ore is loaded into lighters during the South-west monsoon for shipment in the bay ; anchorage is about 4 cables offshore in a depth of 8 fathoms (14m6) "]

Page 215.—Line 9 : *Delete*.

Page 216.—*After* line 11 *insert* :—
Twin white chimneys, from which privately maintained *red* and *green* lights are exhibited, stand about 2 miles east-south-eastward of the entrance to Lian river.

Page 217.—*After* line 29 *insert* :—
As a general rule, vessels use the channel which provides the shortest route into the bay, but entrance by South channel is not recommended during the hours of darkness or in poor visibility.

[**Page 218.**—Line 20 : *For* " 118 feet (36m0) " *read* " 129 feet (39m3) "]

Page 219.—Lines 7-8 : *Delete* " ; with " to " shore "
Line 12 : *For* " pier " *read* " concrete pier "
Line 14 : *After* " ends " *insert* " ; there is only one berth alongside the pier "
After line 19 *insert* :—
Obstructions.—Buoys.—[Beacons.—]An obstruction, with a depth of 27 feet (8m2) over it, lies nearly one cable offshore, about 1¼ cables south-eastward of Blanca point, situated on the western shore of the bay about 6 cables south-eastward of the quarantine pier ; an obstruction, with a depth of 24 feet (7m3) over it, lies about 2½ cables north-eastward of the pier.
An obstruction, with a depth of 7 feet (2m1) over it, marked on its northern side by a black conical buoy, lies about 4¼ cables offshore, 5¾ cables eastward of the quarantine pier.
An obstruction, with a depth of 3 feet (0m9) over it, marked on its western side by a black conical buoy, lies off Lilimbon cove, on the eastern side of the bay about 2¼ cables west-north-westward of Caracol point.
[Two leading beacons, situated about 1¼ miles north-north-westward of Gorda point, in line bearing 012°, lead into a private dry dock ; the front beacon consists of a 12-foot (3m7) pole surmounted by a white triangle, the rear beacon consists of an inverted triangle with a framework topmark.]
After line 22 *insert* :—
[Two, privately maintained, mooring buoys are laid close off Lilimbon cove.]

Digitized by Google

Page 219 continued.

Pilotage.—Pilotage is not compulsory, but if a pilot is required 24 hours' notice must be given.

Page 220.—Line 16 : *After* " *3487* " *insert* " , *plan of Manila and Cavite anchorages* "

Line 17 : *For* " **Lights.—Buoyage** " *read* " **Light** "

Lines 19-25 : *Delete* " ; the point " to " tower "

Line 26 : ———————————————

Line 27 : *After* " tower " *insert* " 50 feet (15m2) in height,"

Line 28 : *Add* :—This light is sometimes difficult to distinguish from the lights of the town.

Lines 29-30 : *Delete* and *substitute* :—

A reclaimed area is indicated on the chart, on the north-western side of the peninsula mentioned above. A tank, 116 feet (35m4) in height, is situated about 3½ cables west-south-westward of the light-structure, and another tank, 115 feet (35m0) in height, is situated about 5½ cables farther south-westward.

Line 34 : *After* " causeway " *insert* " , on the western side of which stands a monument. Cavite harbour lies between Sangley point and the eastern end of Cavite "

Line 36 : *After* " it " *insert* " is obstructed by numerous dolphins and, in 1952, the entrance was mainly foul on account of several wrecks : the bay "

Lines 40-44 : *Delete* " *Charts* " to " obstruction," and *substitute* :—

" **Shoals.—Obstructions.—[Buoys].**—A shoal, with a depth of 16 feet (4m9) over it, lies about half a cable eastward of Sangley point. A shoal,"

Line 46 : *After* " structure " *insert* " ; a shoal, with a depth of 28 feet (8m5) over it, lies about 1½ cables east-south-eastward of this shoal "

After line 46 *insert* :—

Three obstructions lie in or near the fairway about 2 cables southward, 3½ cables south-south-westward, and 4½ cables south-westward, respectively, of Sangley point.

Line 50 : *Delete* [and *substitute* :—

Three buoys, about three-quarters of a cable apart, lie within 1½ cables of the chimney mentioned above ; the northern is a black can buoy, the middle is a red and black spherical buoy and the southern is a red conical buoy.]

Page 221.—Line 1 : *Delete* and *substitute* :—....

Charts 976, 3487.

Lines 5-7 : *Delete* " northern " to " anchorage." and *substitute* " western limit of the prohibited anchorage lies on the meridian of San Nicolas Shoals light-structure (page 219).

Chart 3487, plan of Manila and Cavite anchorages."

[Line 13 : *For* " 9 cables north-north-eastward " *read* " 1½ miles northward "]

Line 14 : *Delete* and *substitute* :—

" point ; [a number of mooring buoys are laid in Canacao bay."]

Line 30 : *Delete* " **Obstruction.**— "

Lines 34-37 : *Delete* " offshore " to " river." and *substitute* " offshore ; on this bank is situated the western breakwater (page 222) of Manila harbour."

Digitized by Google

Page 221 continued.

Line 41 : [*After*] " **Light-buoy.—** " [*insert*] " **Regulations.—** "

Line 44 : *For* ——— " black " *read* " white " ———

Line 47 : *Add* :—The light on this buoy is sometimes difficult to distinguish from the lights of the town.

When approaching the quarantine anchorage in daytime a vessel should display her official numbers or letters. A vessel arriving during the night at the quarantine anchorage must hoist her letters at daylight in addition to " Q " flag ; if the vessel is carrying mail " Y " flag should be displayed until delivery is effected.

All vessels must await the representative of the Immigration Authorities in the quarantine anchorage, with the exception of vessels arriving from China during the summer months ; the latter vessels may be instructed by these authorities to put into Mariveles harbour where they will be boarded by immigration officials.

Page 222.—Line 1 : *Delete* and *substitute* :—

Chart 976.

After line 21 *insert* :—

Chart 3487, plan of Manila harbour.

Lines 34-35 : *Delete.*

Lines 41, 43, 45 : *For* " mast " *read* " tower "

Page 223.—Lines 17-18 : *Delete* " and a " to " south-westward " and *substitute* " an obstruction, over which there is a depth of 18 feet (5^{m}5), lies about 2½ cables south-south-eastward "

Line 23 : *For* " 37 feet (11^{m}3) " *read* " 38 feet (11^{m}6) "

Line 26 : *For* " 40 feet (12^{m}2) " *read* " 39 feet (11^{m}9) "

Line 28 : *For* " 200 feet (61^{m}0) " *read* " 198 feet (60^{m}4) "

[Lines 38-39 : *Delete.*]

[Line 44 : *After* " alongside." *insert* :—No. 11 is a wooden boat landing, 75 feet (22^{m}9) in length.]

After line 48 *insert* :—

Two shoals, which have been swept to a depth of 26 feet (7^{m}9), are indicated on the chart about a quarter of a cable off the north-western side of No. 13 pier.

After line 49 *insert* :—

In [1951], the following depths alongside the various piers were obtainable :—

No. 5 pier	20 to 30 feet (6^{m}1 to 9^{m}1)
No. 7 pier	25 to 27 feet (7^{m}6 to 8^{m}2)
No. 9 pier	25 to 30 feet (7^{m}6 to 9^{m}1)
No. 11 pier	24 feet (7^{m}3)
No. 13 pier	25 to 30 feet (7^{m}6 to 9^{m}1)

Line 54 : *For* " westward " *read* " south-westward "

Page 224.—Lines 3-5 : *Delete* " 6 " to " South " and *substitute* " 4 cables farther south-eastward. A mooring buoy is laid about 1¾ cables east-south-eastward of the northern end of South breakwater, and another about 6¼ cables east-north-eastward of the southern end of the same breakwater ; numerous mooring buoys are laid off the eastern side of West "

[Line 32 : *For* " **Light.—** " *read* " **Lights.—** "]

Digitized by Google

Page 224 continued.

After line 35 *insert* :—

A tower, 55 feet (16m8) in height, stands on the northern entrance point of Pasig river, and a mast, 129 feet (39m3) in height, stands on the southern entrance point.

[Two lights, horizontally disposed, 3 feet (0m9) apart, are exhibited from the 129-foot (39m3) mast mentioned above.]

After line 51 *insert* :—

Chart 3487, plan of Manila harbour.

Page 225.—Line 1 : *For " 3806 " read " 3487, plan of Manila harbour "*

Lines 7-11 : *Delete* and *substitute* :—

Bank.—Obstructions.—A bank, with depths of less than 5 fathoms (9m1) over it, extending about 1¾ miles offshore, fronts the coast northward of West breakwater, and depths of less than 3 fathoms (5m5) are to be found on the bank 1¼ miles offshore. An extensive shoal with a least depth of one foot (0m3) over it lies on the 3-fathom (5m5) part of this bank, north-westward of the entrance to Pasig river; in the centre of the shoal stands a dolphin marking the seaward end of a sewer outlet.

Lines 12-14 : *Delete* " the existence " to " river." and *substitute* " over which the depth is not known, lies on the above bank nearly [2¾] miles north-westward of the tower on the northern side of the entrance to Pasig river ; two obstructions, with depths of 27 and 25 feet (8m2 and 7m6) over them, lie about 1¾ cables [south-south-eastward and 2½ cables southward], respectively, of the before-mentioned obstruction."

Lines 15-16 : *Delete* " 17 " to " 5m2) " and *substitute* " 23 feet (3m0 to 7m0) "

Line 19 : *Delete* " was " to " 1947." and *substitute* " lies eastward of a breakwater which extends about 1¼ miles north-north-westward from a position near the northern entrance point of Pasig river."

Lines 20-21 : *Delete* and *substitute* :—

" numbered 2 to 14 even numbers, extend westward from the coast in North harbour ; a submerged seawall, which dries at low water, runs northward from the root of the northern pier, No. 14."

Lines 27-28 : *Delete* " 1¼ " to " submerged " and *substitute* " 4 cables north-north-westward of the northern "

Line 29 : *For " 36' " read " 37' "*

Lines 43-44 : *Delete* " and " to " tons." and *substitute* " ; one 60-ton crane is the largest available, and there are 6 floating cranes of 25 tons capacity."

Page 226.—Line 11 : *Delete.*

Page 228.—Lines 4-5 : *Delete* and *substitute* :—

A red conical light-buoy, exhibiting a *red flashing* light *every four seconds*, is moored near the north-western edge of the reef fringing Grande island.

Lines 13-14 : *Delete* " A light " to " point," and *substitute* :—

" A black can light-buoy, exhibiting a *green flashing* light *every four seconds*, is moored about 4 cables south-south-eastward of Agushin point, situated "

Digitized by Google

Page 228 continued.

[Line 28 : *For* " buoy " *read* " bell-buoy "]

[Lines 40-41 : *Delete* and *substitute* :—

A white concrete tower, formerly a lighthouse, stands on Mayanga islet.]

Page 229.—Lines 27-29 : *Delete* " indi- " to " island." and *substitute* " not indicated on the chart, south-eastward of Caiman shoal (*see* below)."

Lines 38-39 : *Delete* " , about " to " light-tower,"

Lines 41-43 : *Delete* " from " to " shoal." and *substitute* :— " of the shoal."

Line 45 : *Delete* " the light-tower on "

After line 50 *insert* :—

A conspicuous radio tower, 125 feet (38m1) in height, is situated near the water front, about 8 cables south-eastward of Kalaklan light-structure ; the tower is painted in black and yellow bands, and is marked by *red* lights at 50-foot (15m2) and 125-foot (38m1) levels.

Page 230.—Lines 12, 22 : *Delete* " light-tower "

Page 233.—Line 2 : *For* " 89 feet (27m1) " *read* " 90 feet (27m4) "

Page 235.—[Line 9 : *After* " **Buoys.**— " *insert* " **Pilots.**— "]

[Line 14 : *After* " point " *insert* " ; its northern extremity is marked by a red conical buoy, No. 2 "

[Lines 21-22 : *Delete* " its " to " cables " and *substitute* " a "] wooden pile beacon stands about half a cable south-eastward of the northern extremity of this reef, and about 7 cables "

[Lines 27-28 : *Delete* " A black " to " reef." and *substitute* :—A] wooden pile beacon stands about half a cable south-south-eastward of the south-eastern part of the [latter] reef.

Line 38 : [*After* " beacon " *insert* " , and by a black can buoy, No. 3"]

[Line 41 : *For* " shore." *read* " shore, and marked by black can buoys, Nos. 5 and 7, moored, respectively, about half a mile south-south-westward and one mile south-south-eastward of Tagapolo point ; these buoys mark the eastern side of the channel leading to the wharf about one mile south-eastward of Tagapolo point (page 236). The western edge of this channel is marked by a red conical buoy, No. 4, moored about three-quarters of a mile south-south-eastward of Tagapolo point."]

[*After* line 54 *insert* :—

Pilots are stationed at Masinloc. Pilotage to and from the pier at Port Masinloc is compulsory for merchant vessels.]

Page 238.—[Line 6 : *Delete* " **Buoy.**— "]

[Lines 17-18 : *Delete* ", marked " to " side,"]

[Line 20 : *Delete* " , and " to " beacon "]

[Line 26 : *Delete* " 4 " to " 5 " and *substitute* " 5 cables north-westward of No. 6 "]

After line 26 *insert* :—

Two pile beacons stand off the northern entrance point of the harbour.

Digitized by Google

Page 238 continued.

[Line 28 : *After* " importance " *insert* " ; there is a small hospital "]
[Line 31 : *After* " **Directions.**— " *insert* " **Beacons.—Pilotage.**— "]
Lines 34-36 : *Delete* " with " to " mile." and *substitute* " off the southern end of the town of Santa Cruz."
[Lines 43-44 : *Delete* " head " to " it " and *substitute* " leading beacons, consisting of two triangles, situated on the head of the wharf and a short distance south-eastward, come into line, bearing 123°, she should steer for them "]
[Line 46 : *Add* :—Pilotage to and from the pier is compulsory for merchant vessels.]

Page 240.—Lines 37-38 : *Delete* " with " to " side,"
Line 40 : *For* " white cliff " *read* " point "

Page 244.—Line 46 : *For* " **Light** " *read* " **Lights** "
After line 52 *insert* :—
A *red* obstruction light is exhibited, at an elevation of 230 feet (70m1), from a tower situated about half a mile east-south-eastward of the light-structure on Guecet point.

Page 247.—Line 9 : *Delete.*
Lines 21-22 : *Delete* and *substitute* :—
" a schoolhouse, with a galvanized iron roof, situated on the northern side of the entrance nearly 3½ cables east-north-eastward of the old fort referred to above, is reported to be a good landmark for vessels entering the inlet."

Page 250.—Line 17 : *Add* :—In 1951, the pier was destroyed.
Lines 25-26 : *Delete* " about " to " pier." and *substitute* " in the southern part of the harbour, about 3¾ cables south-eastward of the old tower."

Page 252.—Line 4 : *Add* :—In 1951, the pier was reported to be destroyed.
Lines 10-12 : *Delete* and *substitute* :—
Reefs extend about half a cable offshore from a point situated about 9 cables south-eastward of the southern extremity of Pinget island.
Lines 18-20 : *Delete* " midway " to " above." and *substitute* " half a mile south-eastward of the southern extremity of the island."

Page 255.—Line 44 : *For* " depth of 21 feet (6m4) " *read* " least depth of 18 feet (5m5) "
Line 45 : *Add* :—A conspicuous red warehouse is situated near the root of the pier.

[**Page 256.**—Line 42 : *After* " **bank** " *insert* " **and dangers** "]
[Line 44 : *Add* :—A danger, over which the depth is not known, is charted in Lat. 18° 00′ N., Long. 119° 22¼′ E., about 64 miles westward of Port Kurrimao.
An obstruction, is reported to lie about 8 miles westward of the mouth of Laoag river.]

Digitized by Google

Page 257.—Lines 30-31 : *Delete.*

Page 258.—Line 54 : *Delete* " , southward " to " light-tower "

[**Page 260.**—*After* line 3 *insert* :—

Off-lying bank.—The southern end of a bank, with depths of from 12 to 18 fathoms (21^{m}9 to 32^{m}9) over it, was reported, in 1952, to lie about 10 miles west-south-westward of Pratas island.]

[Line 8 : *After* " north-eastward " *insert* " and eastward "]

[Line 22 : *Add* :—In 1952, tide rips and overfalls were passed through on several occasions, during an unsuccessful search for shoal water, in Lat. 20° 07′ N., Long. 119° 28′ E. and its vicinity, about 150 miles east-south-eastward of Pratas reef.]

Page 269.—Cavite harbour : Prohibited anchorage ; *For* " 220 " *read* " 221 "

Digitized by Google

NEW AND ALTERED NAMES

The following list gives new names and alterations in old names which will be adopted in all Hydrographic publications affected as opportunity occurs :—

New name.	Page of Pilot.	Obsolete name.
Asam, Sungei	82	—
[Basket rock	100	—]
Batang Marou, Tanjong	95	Batang Marow, Tanjong
Batu, Tanjong ; Groote Sambas rivier	81	—
Blanca point	219	—
[Bregum, Tanjong	100	—]
Calauit bay	206	—
Calauit island	206	—
Caracol point	219	—
[Christine shoals	100	—]
[Cochrane bank	100	—]
Coleman shoal	128	—
Dampier shoals	139	—
Ditipac river	206	—
[Elizabeth shoals	100	—]
[Farr bluff	100	—]
Hankin shoal	127	—
Hayter shoal	129	—
[Horn rock	100	—]
[Inner shoals	100	—]
[Isobel shoals	100	—]
[James reef	100	—]
[Jonah shoal	100	—]
[Kadri cove	100	—]
[Kennett bank	100	—]
[Likau rocks, Sungei, Tanjong.	99	—]
Lilimbon cove	219	—
[Madalene shoals	100	—]
Mani, Tanjong	97	—
[Marie shoal	100	—]
[Mark reef	100	—]
[North shoal ; Acis shoals	100	—]
[Nyalau, Sungei	100	—]
Paisley shoal	127	—
[Panapa, Sungei	100	—]
[Patok, Tanjong	99	—]
[Patricia shoal	100	—]
Price shoals	128	—

Digitized by Google

NEW AND ALTERED NAMES—*continued.*

New name.	Page of Pilot.	Obsolete name.
[Ruth shoals . . .	100	—]
[Sabulong, Sungei . .	100	—]
[Scott patches . . .	127	—]
[Sebatuan, Sungei . .	82	Se Batu, Sungei]
Sebuboh, Bukit . . .	117	—
[Sedanai, Tanjong . .	99	—]
[Semebah, Batu, Sungei .	100	—]
[Setiam, Bukit . .	98	—]
Sewai, Tanjong . . .	99	—
[Similajau, Sungei . .	100	—]
Sinulop, Sungei . . .	117	—
[South shoal . . .	100	—]
[Stag point . . .	100	—]
Subah, Sungei . . .	82	—
[Subis, Gunong . . .	99	Silungen, Gunong]
[Ursula shoals . . .	100	—]
[White rock : Kuala Similajau . . .	100	—]
[Wilson shoal . . .	100	—]
[Wiser bay . . .	100	—]

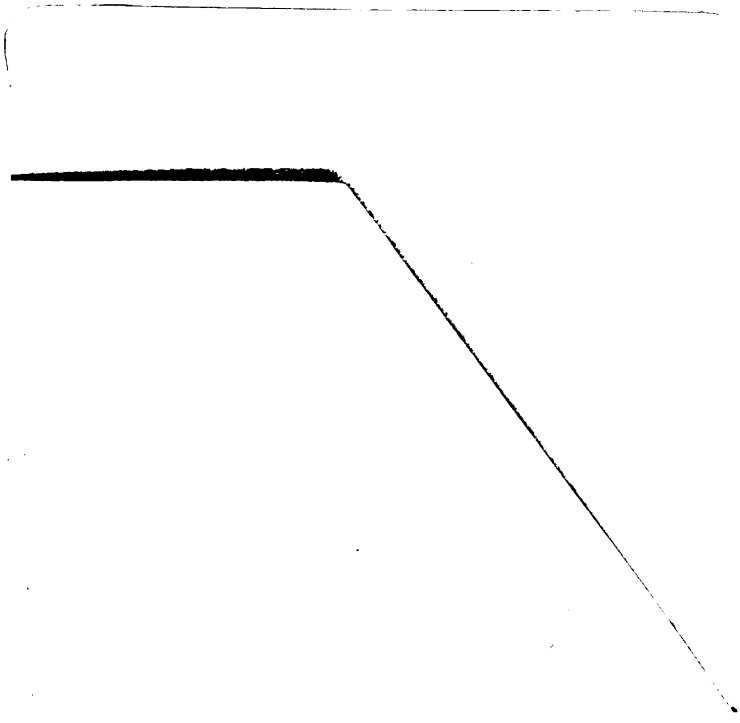
Printed in Great Britain under the authority of Her Majesty's Stationery Office
by Charles Birchall and Sons, Limited, 17 James Street, Liverpool, 2
Wt 32763/44164 5/54 K27 C.B.&S.Ltd. Gp.575

Digitized by Google

Digitized by Google

Digitized by Google

Digitized by Google



Digitized by Google

UNIVERSITY OF MINNESOTA
wils v.2
656 G79ca
Great Britain. Hydrographic Dept.
China sea pilot.
3 1951 002 423 366 0

WILSON
ANNEX
AISLE 59